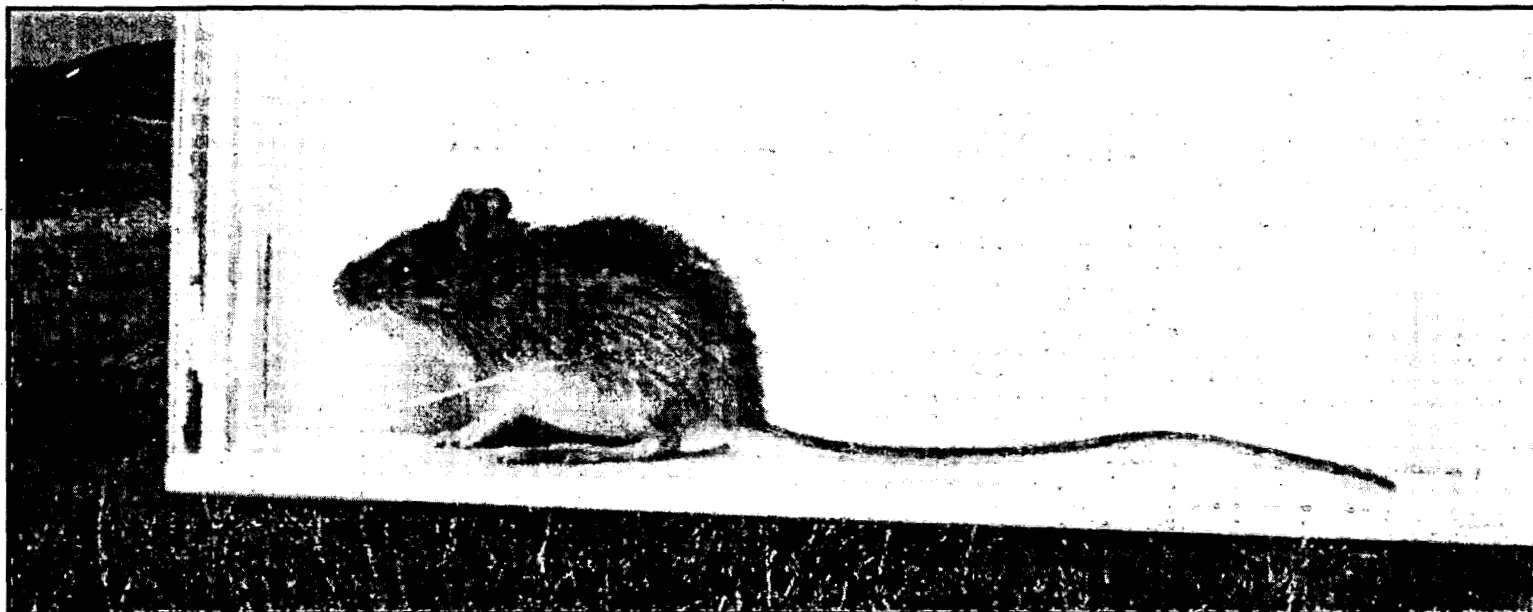Best Available
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2004 USFWS Biological Opinion Reports

for the Rocky Flats Environmental Technology Site

(click on the title of the report below to access the report)

- <u>Water Measurement Flume Replacement Project Report</u>

    - <u>Incinerator Project Report</u>

        - <u>Part II, PBA Report</u>

Preble's Mouse Mitigation Monitoring Report for the Water Measurement Flume Replacement Project at the Rocky Flats Environmental Technology Site
2004 Annual Report
USFWS Biological Opinion # ES/GJ-6-CO-02-F-18

Introduction

This report is being submitted to the United States Fish and Wildlife Service (USFWS) in order to comply with terms and conditions outlined in USFWS Biological Opinion (BO) # ES/GJ-6-CO-02-F-18. The BO refers to the impacts to the federally-listed Preble's meadow jumping mouse, (Preble's mouse, *Zapus hudsonius preblei*), from the Water Measurement Flume Replacement Project at Rocky Flats Environmental Technology Site (Rocky Flats). Term number four under the "Terms and Conditions" of the Incidental Take Statement specifies monitoring of mitigation, revegetation, and enhancement efforts will be conducted and that a report of the monitoring data, including photographs, needs to be submitted to the USFWS by December 1 after each growing season. This report is being submitted to satisfy the conditions of term number four for 2004.

Methodology

The pre-existing vegetation monitoring took place on August 7, 2002, during the height of the growing season. Originally three flumes were planned for replacement. During the duration of the project, however, it was decided that GS10 would not be replaced. Work, and therefore monitoring, was only conducted at GS03 and SW093. Therefore the 2004 report only reports data for the latter two flumes. During 2004, monitoring was conducted on August 9.

At both of the project locations (GS03 and SW093; Figure 1), two linear transects were originally placed parallel to the stream channel in 2002. The length of the transects varied depending on the size of the project area at each location. The transect endpoints were permanently marked with rebar and flagging. Four- 0.5 m^2 rectangular quadrats were randomly placed along each transect, for a total of eight quadrats for each project location. Species richness within each quadrat was recorded for those species rooted within the quadrat. Overall herbaceous vegetation, litter, and bare ground cover were visually estimated for each quadrat. Cover estimates were conducted using the following cover class system: 0 = 0%, 1 = <5%, 2 = >5% - 25%, 3 = >25% - -50%, 4 = >50% - 75%, and 5 = >75%. Cover class midpoints were used to determine the percent of cover for each of the aforementioned variables (1 = 2.5%, 2 = 15%, 3 = 37.5%, 4 = 62.5%, 5 = 87.5%). Photographs of each project areas were taken from random locations. These photo points were marked with a flag and mapped with a GPS unit. Summaries were made of the 2004 data and compared to the 2002 and 2003 data.

Mitigation shrub plantings were installed at the two flume locations and along the stream at the habitat enhancement area in Woman Creek in mid-June 2003 (Figure 1). Reseeding of the two flume locations was conducted during the same time period. Total counts of the number of trees and shrubs planted were made at each location after planting was completed. End of season counts of the number of surviving plants was made on September 8-9, 2003 and August 9, 2004. Summaries were made of the tree/shrub count data to compare the number of planted individuals to the number surviving in late summer 2004.

Success criteria outlined in the Biological Assessment (BA) and BO were as follows:

1. Successful recovery of the herbaceous cover (graminoids and forbs) will be met when the disturbed areas have returned to 80% of the pre-disturbance overall vegetation cover.
2. Noxious weed cover of less than 5%.
3. Tree and shrub survival success is defined as at least 80% survival of the planted material.

Results and Discussion

Table 1 compares the species richness for the two project locations for 2002 (pre-construction) and 2003-2004 (post-construction). At GS03, total species richness increased from 12 species in 2002 to 34 species in 2003 and then dropped to 30 species in 2004. The large initial increase was attributable to the abundance of early successional and weedy species that came up after the area was disturbed at GS03. At SW093, the total species richness has steadily increased from 11 species in 2002 to 18 species in 2004. The lower species richness observed at SW093 compared to GS03 is probably attributable to the shady conditions present at SW093. For many of the early successional and weedy species found at GS03 in 2003, full sunlight is required to germinate and establish. These conditions are not available at SW093 where tree canopy provides shady conditions. At both locations, post-construction species richness is higher than the pre-construction conditions.

Table 2 compares the average cover of bare ground, litter and herbaceous vegetation (graminoid and forb) for the two project locations between years. Bare ground cover increased from 2002 to 2003 at both locations. By 2004, however, the amount of bare ground was beginning to decrease at both locations, with a greater decrease observed at GS03. The amount of bare ground cover in 2004 is still substantially higher than the pre-construction amounts at both locations. The higher bare ground amount at SW093 compared to GS03 is likely attributable to the shady conditions present along the transect. Litter cover decreased initially at both locations from 2002 to 2003. In 2004, litter cover still is less than half the amounts present prior to construction activities. Litter cover will increase over time as current year live vegetation growth dies back and becomes matted down by winter snows. Herbaceous cover (grass and forb) continues to do well at both locations. At GS03, pre-construction foliar cover was 56.3% in 2002. In 2004, total foliar cover was 50.0%, which is 89% of the pre-existing conditions. This value exceeds the success critieria requirement that post-construction total herbaceous foliar cover be at least 80% of pre-construction total herbaceous cover. The slight decline in total herbaceous foliar cover at GS03 from 2003 to 2004 is a predominantly the loss of cover of kochia (*Kochia scoparius*) in one of the quadrats. It was very dominant in 2003 and was hardly present in 2004. At SW093, the original herbaceous cover was only 13.1% (largely due to the shady conditions at that location). In 2004, total herbaceous foliar cover was 25.9% (nearly double the original amount). SW093 also meets the 80% of pre-construction cover requirement of the success criteria.

Noxious weed cover data is summarized in Table 3. Pre-construction noxious weed cover was 7.19% at GS03 and 3.44% at SW093 in 2002. In 2003, noxious weed cover doubled at GS03 while it decreased by two-thirds at SW093. In 2004, noxious weed cover had dropped to less than half the pre-construction amount at GS03 and was approximately the same as the pre-construction amount at SW093. The success criteria requirement is that less than 5% of the total foliar cover is to come from noxious weed species. Therefore in 2004 both GS03 and SW093 have met this criteria. NOTE: The BA/BO states that noxious weed cover will be determined through the use of the most recent Colorado state noxious weed list. The state list was updated in May 2004 and the new noxious weed species list was used to calculate the 2004 noxious weed cover values. The 2002 and 2003 values were calculated using the noxious weed list in effect during those years respectively.

Tree and shrub survival data are presented in Table 4. At GS03, 100% of the snowberry (*Symphoricarpos occidentalis*) was surviving in 2004. Chokecherry (*Prunus virginiana*) survival was 80% (one of the five plants had died). Coyote willow (*Salix exigua*) survival was 108% for the potted willows and 67% for the willow stakes. Because the willows had increased and grown together it made it difficult to get an accurate count of either the potted or staked plant material. The willow stake survival rate in particular is not accurate because the willows had grown together to the point where it was no longer possible to identify the individual stakes for the final counts by the end of the summer. Where the willow stakes were put in along the stream a nice stand of willow had established by the end of the summer. Prior to the project, no willow occurred on the south side of the stream. However, in 2004 a good stand of willow has been established, thus improving the habitat for the Preble's mouse. Additionally, along the north side of the stream where the willow had been clipped off prior to the project activities to provide the willow stakes, the willow regenerated abundantly from the underground root stock. The root stocks had been buried under one to two feet or more of soil during the

2

re-grading and contouring of the streambank. But the willow shoots came up abundantly. The establishment and survival of the woody vegetation at GS03 has done very well. The overall survival of all the planted woody material at GS03 was approximately 103% without the willow stakes included and approximately 75% with the willow stakes included (the willow stake counts were inaccurate however). [It should be noted that at GS03 the planting of both coyote willow shoots (127) and potted materials (25) far surpassed the number that were required to be planted by the BA (75 shoots or 25 potted plants)].

At SW093, 100% of the plains cottonwood (*Populus deltoides*), snowberry, and chokecherry were surviving in 2004. Coyote willow survival was approximately 93%. Overall survival of all the planted woody material at SW093 was approximately 96%.

At the mitigation enhancement area, a total of 371 potted shrubs were planted. Of these, 369 had survived through 2004 (99.5% survival). Only two of the golden current (*Ribes aureum*) plants had died. All the snowberry and chokecherry were still surviving. Overall survival of the planted woody material at the enhancement area has been very good.

Currently the shrub survival rates at GS03, SW093, and the mitigation enhancement area are all above the 80% survival rates required by the BA/BO. The high shrub survival rates are attributable to several factors. During the summer of 2003 after the shrubs were planted the plants were watered through the use of DriWater® tubes and weekly watering. The use of DriWater® tubes provided a slow continual watering of the potted plant material at all three locations. These tubes were changed once after the original plant installation during the growing season of 2003. The original intention was to use these tubes for all water needs for the plants during 2003. However, because of the low precipitation received at the Site during the summer of 2003 and the withering condition of many of the plants, the decision was made to supplement the DriWater® tubes with additional weekly watering of the planted materials to enhance the survival chances of the shrubs. The BO had stated that the use of only the DriWater® tubes would not be considered supplemental watering during the first growing season, however, given the low precipitation situation during 2003, it was decided the additional watering was necessary to prevent incurring large costs involved in replanting much of the plant material. This reset the clock for monitoring at these locations by a year. The BO states that monitoring would be continued for a minimum of three growing seasons total and for at least two years once watering was stopped. During 2004, no supplemental watering of the shrubs was conducted. Above average precipitation during the summer months has benefited the planted shrubs and allowed them to not only survive but increase in size during 2004. Monitoring of the shrubs will be continued through at least the 2005 growing season.

The photographs in Figures 2 through 9 compare the pre-construction with the post-construction conditions at the different locations.

Conclusions

Pre- and post-construction mitigation monitoring for the Water Measurement Flume Replacement Project were compared for the 2003 and 2004 growing seasons. Success criteria for vegetation cover, noxious weed cover, and tree and shrub survival were met at each of the three mitigation locations for their respective requirements. Monitoring will be continued in 2005 to meet the two year monitoring requirement after watering ceased. This information will be beneficial in determining the success of the mitigation plantings for the project and for future revegetation and mitigation work at the Site.

Table 1: Species Richness (species list) for each of the three Flume Replacement locations at Rocky Flats Environmental Technology Site.

Species	GS03			SW093		
	2002	2003	2004	2002	2003	2004
Agropyron caninum			X			X
Agropyron intermedium		X			X	X
Agropyron repens	X			X		
Agropyron smithii	X		X		X	X
Agrostis stolonifera				X		
Ambrosia psilostachya		X	X			X
Aster falcatus				X		
Barbarea vulgaris			X			
Bromus inermis	X	X	X	X	X	X
Bromus japonicus		X	X			
Camelina microcarpa						X
Carex praegracilis	X					
Centaurea diffusa		X	X		X	X
Chenopodium album		X	X			
Chenopodium sp.		X				
Cirsium arvense	X	X	X	X	X	X
Convolvulus arvensis					X	X
Cynoglossum officinale				X		
Descurainia pinnata		X				
Echinochloa crusgallii		X				
Elymus canadensis						X
Erodium cicutarium			X			
Festuca pratensis	X	X	X			
Glycyrrhiza lepidota	X	X	X		X	
Grindelia squarrosa			X			X
Helianthus annuus		X	X		X	
Juncus bufonius				X		
Kochia scoparia		X	X			X
Lactuca serriola		X	X			X
Medicago lupulina		X	X			
Melilotus alba			X			
Melilotus officinalis		X	X		X	X
Mertensia lanceolata		X				
Oenothera villosa			X			
Panicum capillare		X	X			
Poa compressa	X	X				
Poa pratensis	X	X		X	X	X
Polygonum arenastrum		X			X	X
Polygonum pensylvanicum		X				
Polygonum persicaria		X				
Polygonum ramosissimum			X			
Psoralea tenuiflora			X			
Rosa arkansana	X					
Rumex crispus		X				
Rumex sp.		X	X			
Salix exigua				X	X	X
Salsola iberica		X	X			
Setaria viridis		X	X			

Species	GS03			SW093		
	2002	2003	2004	2002	2003	2004
Solidago missouriensis				X		
Stipa viridula	X					
Symphoricarpos occidentalis	X	X	X	X	X	X
Thlaspi arvense		X				
Trifolium repens		X				
Unknown		X	X		X	
Verbascum thapsus		X	X			
Verbena bracteata		X	X			
Total	12	34	30	11	14	18

Table 2: The average cover at the two flume replacement project locations.

Location	Bare Ground Cover			Litter Cover			Herbaceous Cover		
	2002	2003	2004	2002	2003	2004	2002	2003	2004
GS03	0.3%	22.8%	14.4%	87.5%	38.4%	40.0%	56.3%	56.3%	50.0%
SW093	3.1%	48.8%	43.1%	87.5%	31.3%	35.9%	13.1%	16.6%	25.9%

Sample size at each location: n = 8.

Table 3: The average noxious weed cover at the two flume replacement project locations.

Location	Noxious Weed Foliar Cover		
	2002	2003	2004
GS03	7.19%	14.4%	3.75%
SW093	3.44%	0.09%	3.13%

Sample size at each location: n = 8.
Note: In May 2004, the Colorado Noxious Weed Act was revised and several species that occur at the Site which were previously considered noxious weeds were removed from the state weed list. A portion of the change in noxious weed cover is a result of this change. The BA/BO states that the most recent Colorado noxious weed list will be used to determine noxious weed status.

Water Measurement Flume Replacement Project

Figure 1

LEGEND

- PMJM Habitat Enhancement Mitigation Area
- ⊙ Flume Replacement Locations In-situ mitigation)

Standard Features

- ▢ Buildings
- ▨ Demolished Buildings
- ■ Lakes & ponds
- — Streams & ditches
- ---- Fences
- ═ Paved roads
- ----- Dirt roads
- — Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by ED&O R&L, Las Vegas. Digitized from the orthophotographs. 1/95.

Neither the United States Government nor Kaiser Hill Co., nor Exponent, nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights.

N

1:22044

1000   0   1000   2000 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: E^ponent

For: Kaiser-Hill Company, LLC

RFETS GIS Dept. 303-966-7707

MAP ID: 02-0001   February 22, 2001

GS03

SW093

GS10

PMJM Habitat Enhancement Area

Figure 2. Comparison of pre- and post-construction vegetation conditions at GS03.
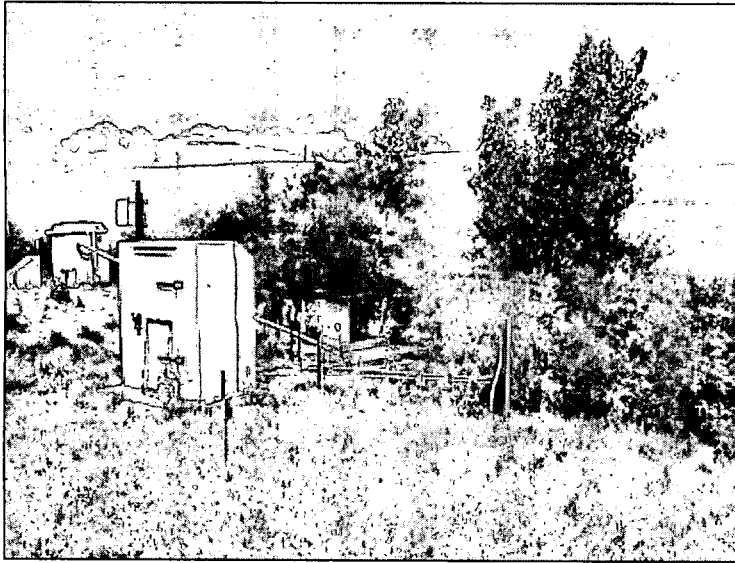
Pre-construction Summer 2002
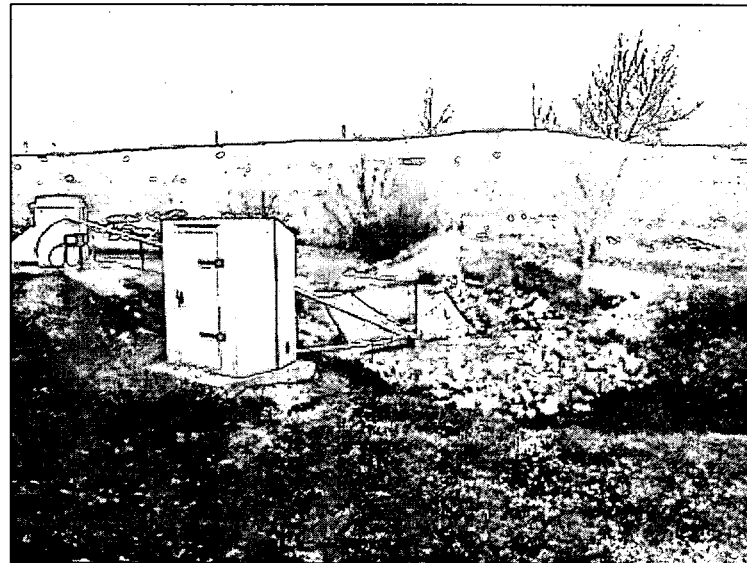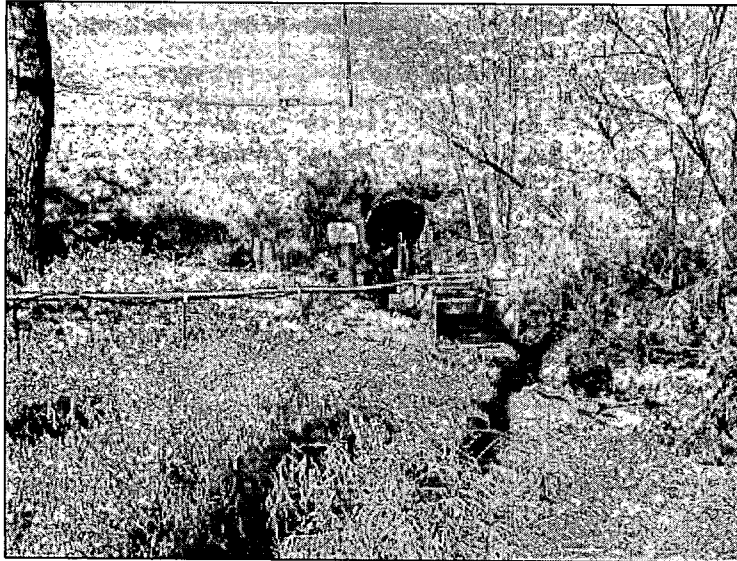
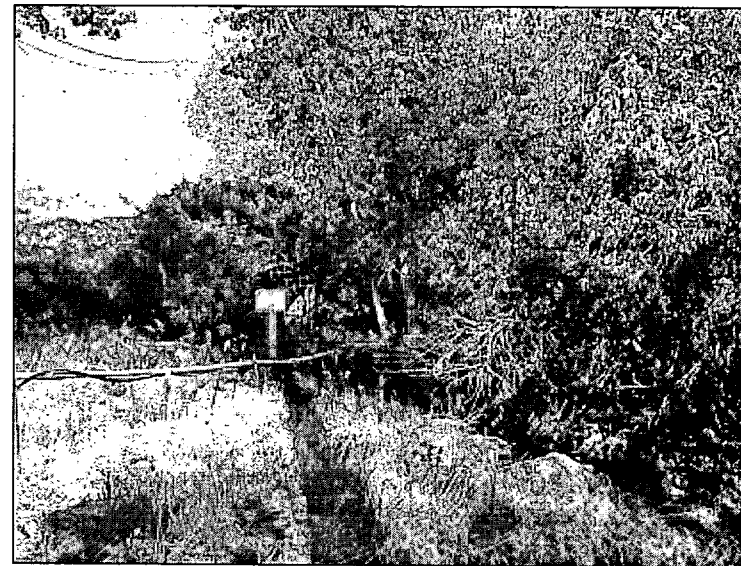Post-construction Winter 2002/2003
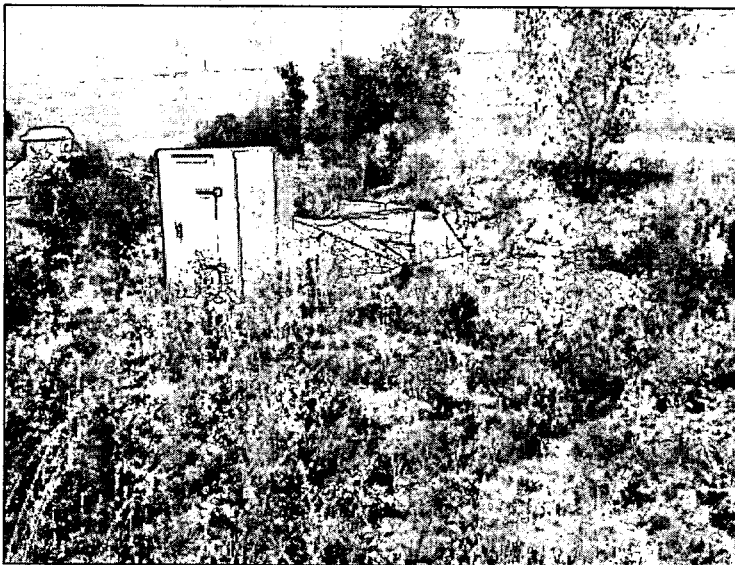
Post-construction Summer 2003
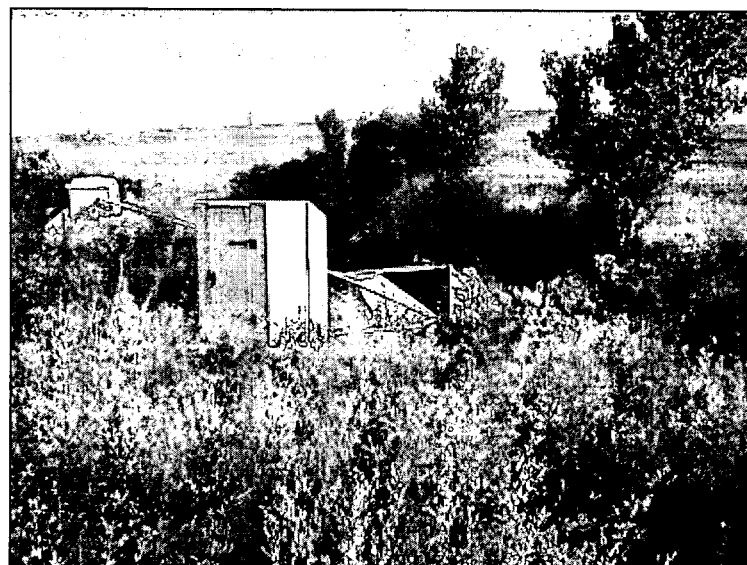
Post-construction Summer 2004

Figure 3. Comparison of pre- and post-construction vegetation conditions at GS03.
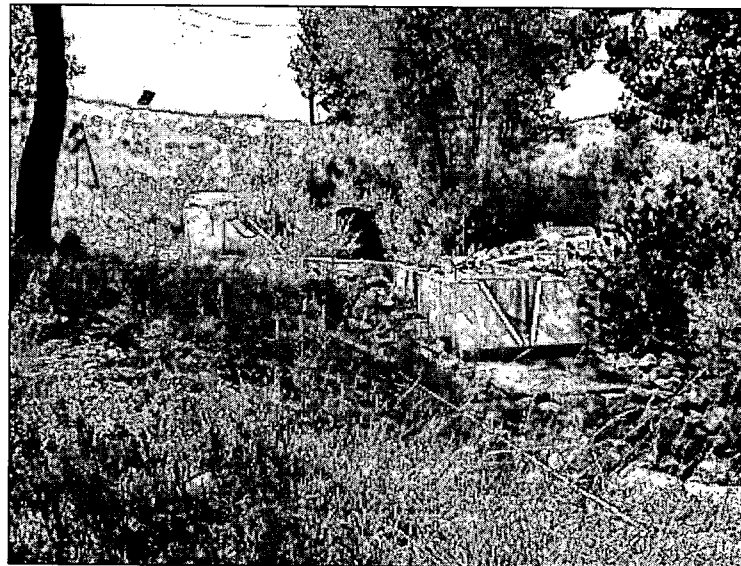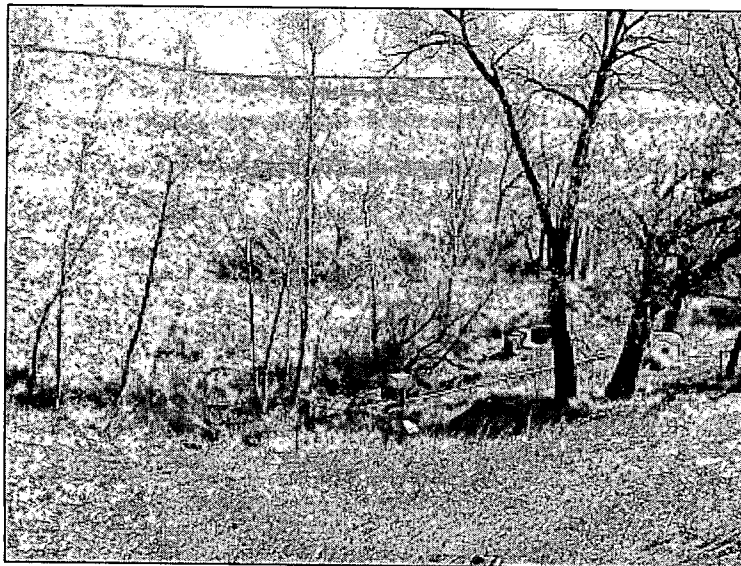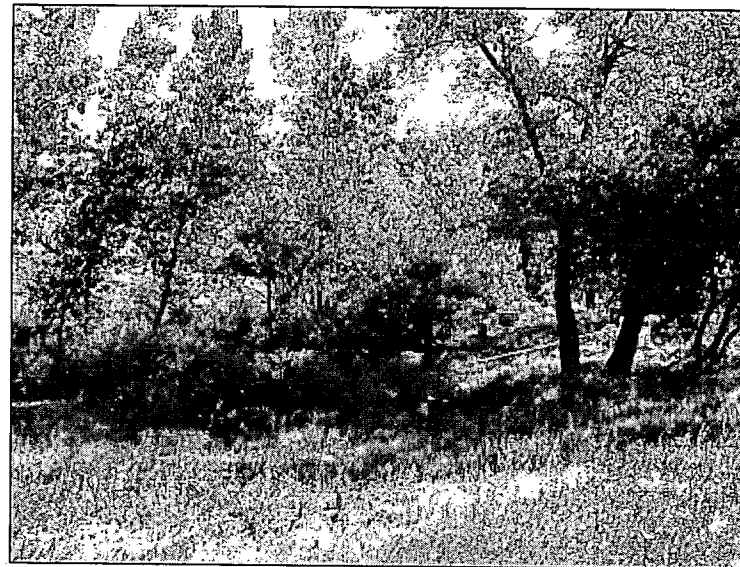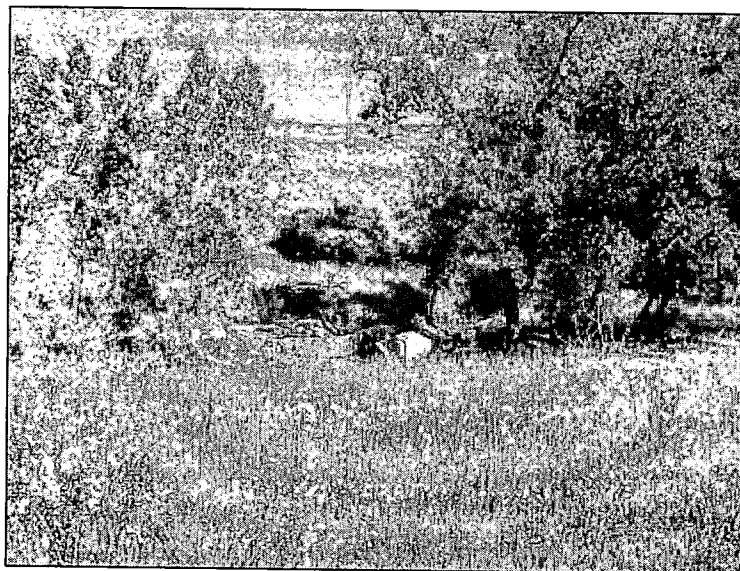

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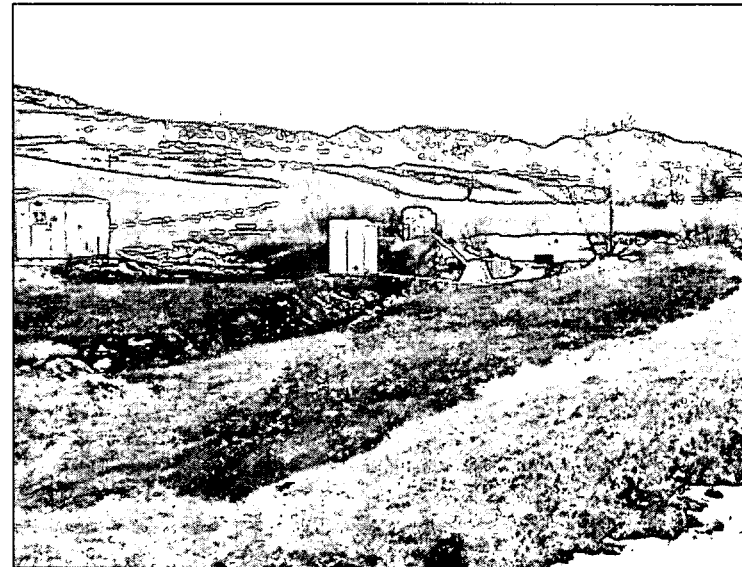
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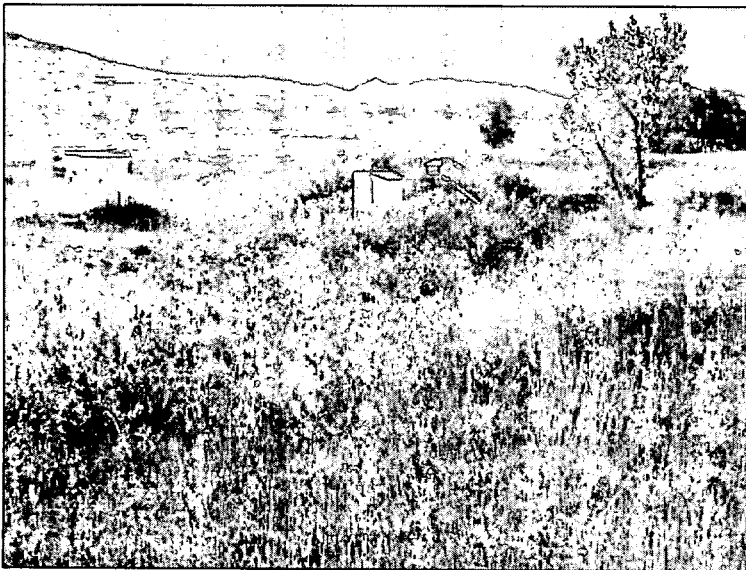
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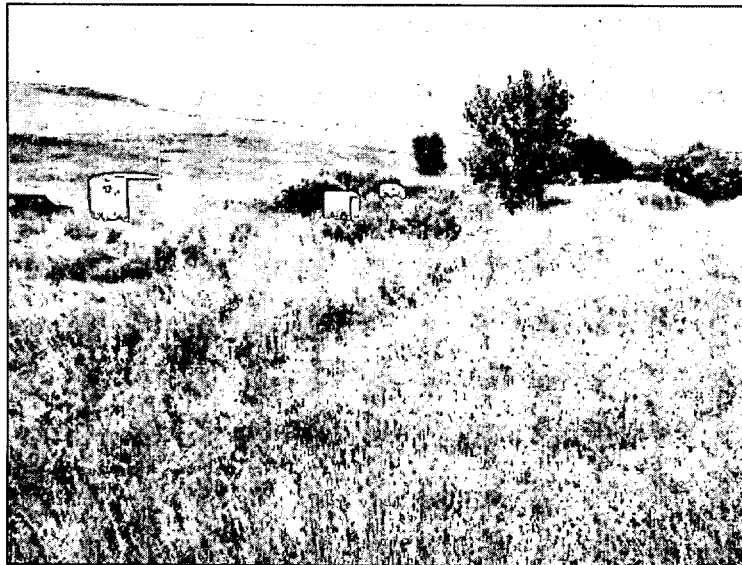
Post-construction Summer 2004

Figure 4. Comparison of pre- and post-construction vegetation conditions at GS03.

Pre-construction Summer 2002
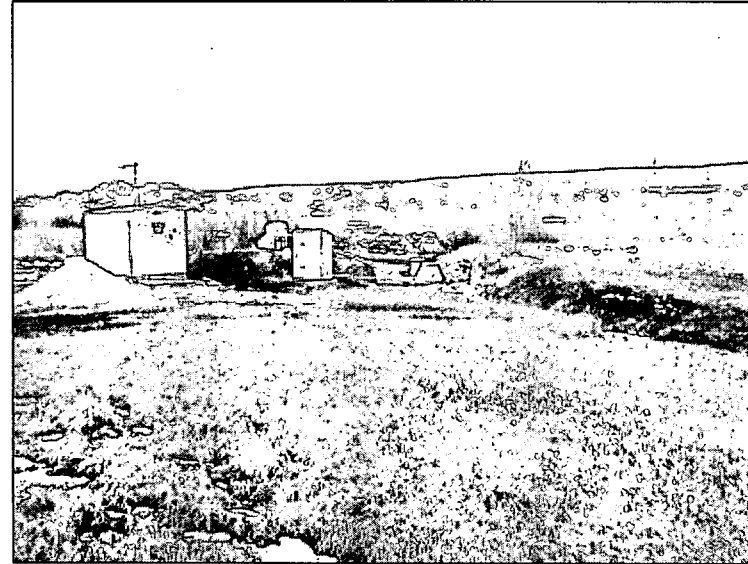
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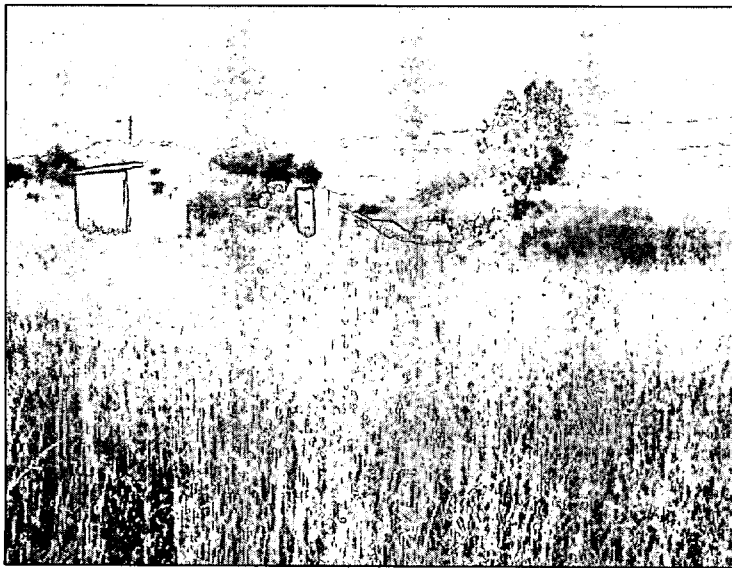
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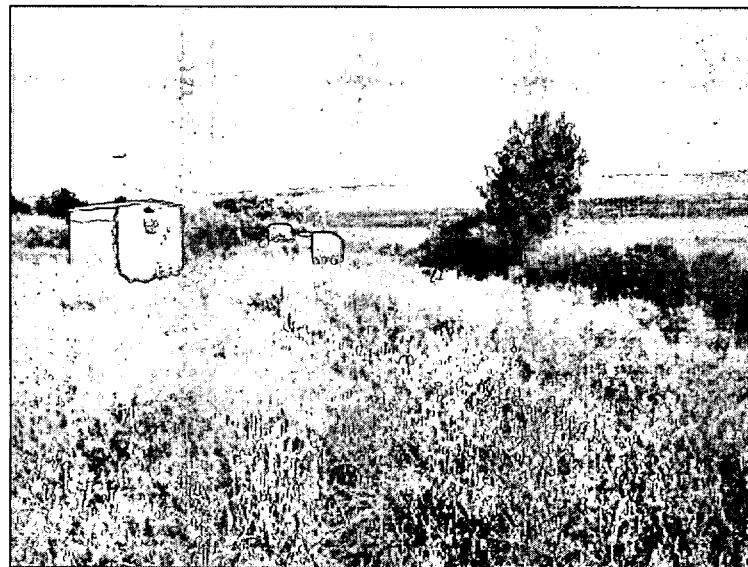
Post-construction Summer 2004

Figure 5. Comparison of pre- and post-construction vegetation conditions at SW093.

Pre-construction Winter 2002/2003
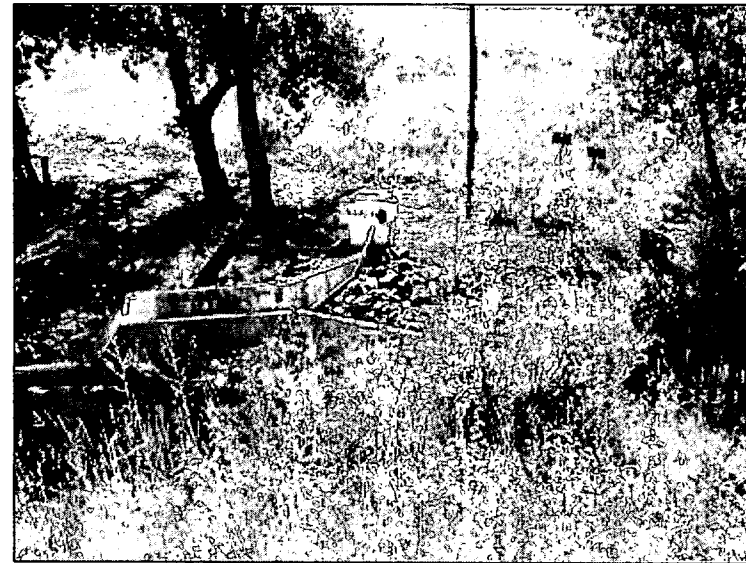
Post-construction Summer 2003

Post-construction Summer 2004

Figure 6. Comparison of pre- and post-construction vegetation conditions at SW093.

Pre-construction Winter 2001/2002

Pre-construction Summer 2002

Post-construction Summer 2003

Post-construction Summer 2004

Figure 7. Comparison of pre- and post-construction vegetation conditions at SW093.

Pre-construction Winter 2001/2002

Pre-construction Summer 2002

Post-construction Summer 2003

Post-construction Summer 2004

Figure 8. Comparison of pre- and post-planting conditions at the Enhancement Area.
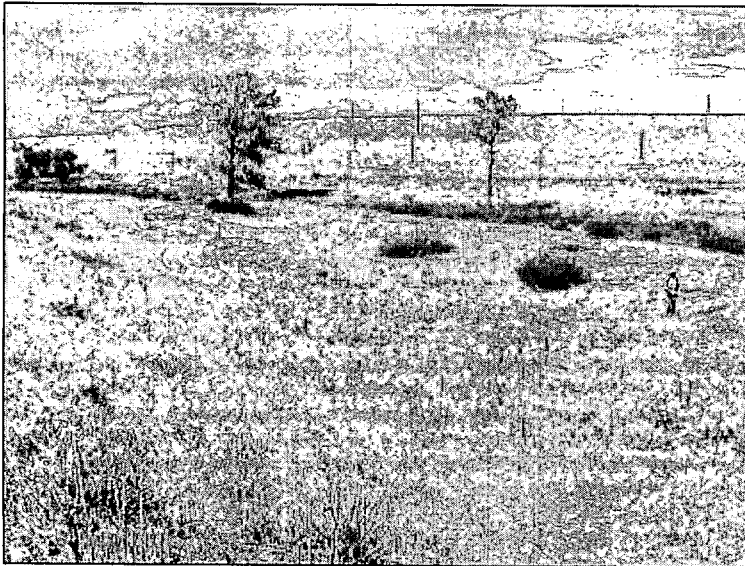
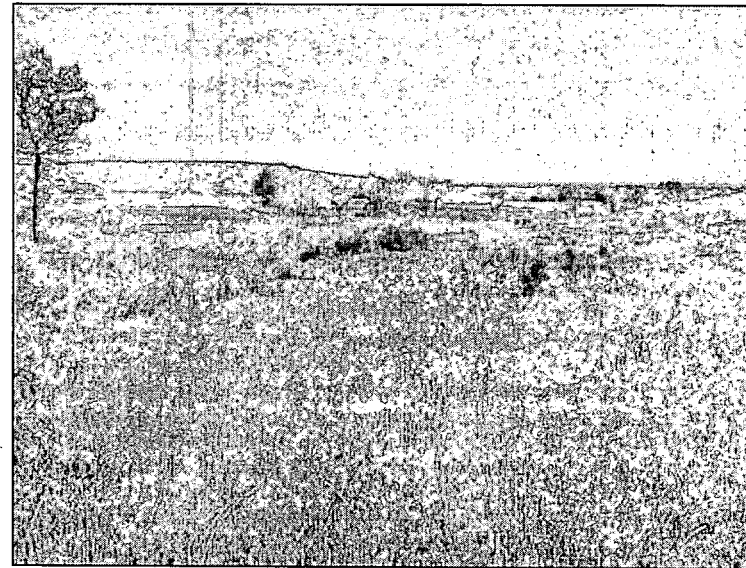Pre-planting Spring 2003
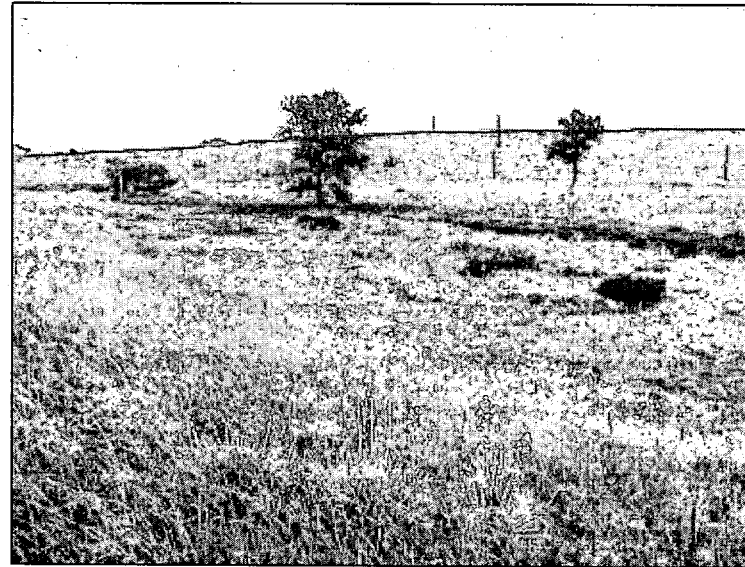
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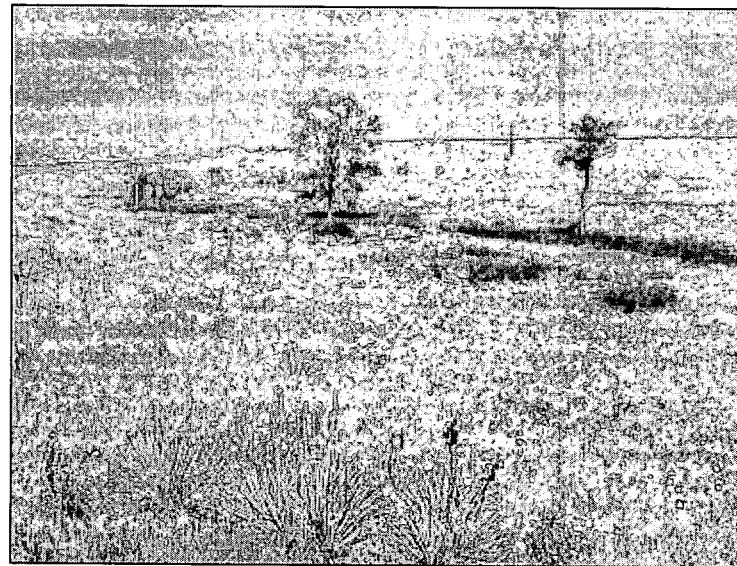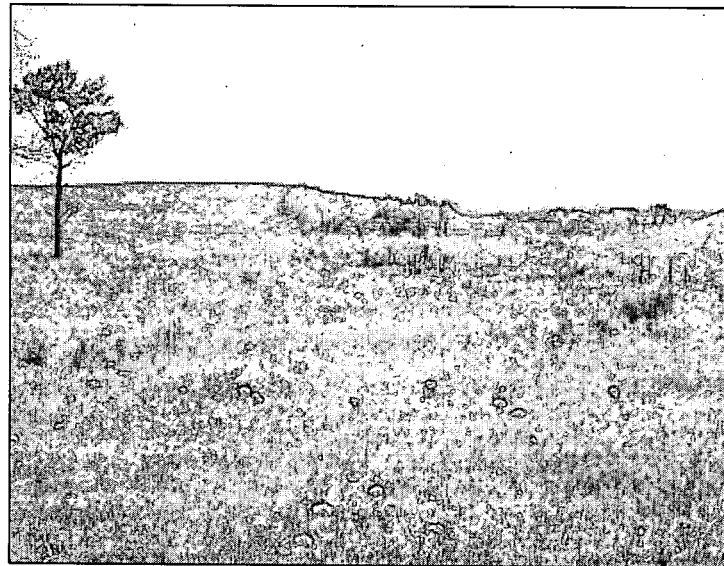

Post-planting Summer 2004

Figure 9. Comparison of pre- and post-planting conditions at the Enhancement Area.
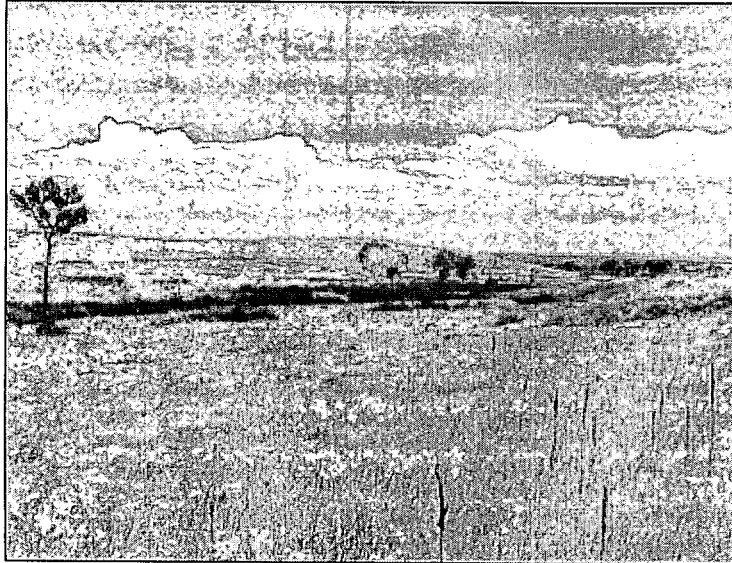
Pre-planting Spring 2003

Post-planting Summer 2003

Post-planting Summer 2004

Preble's Mouse Mitigation Monitoring Report for the Incinerator Project at the Rocky Flats Environmental Technology Site
2004 Annual Report
USFWS Letter: ES/CO: BZ Concrete Flow (April 28, 2003)

Introduction

This report is being submitted to the United States Fish and Wildlife Service (USFWS) in order to comply with the requirements outlined in a letter from the USFWS on the Buffer Zone Concrete Removal Project (hereafter referred to as the Incinerator Project; USFWS Letter dated April 28, 2003). The letter refers to the impacts to the federally-listed Preble's meadow jumping mouse, (Preble's mouse, *Zapus hudsonius preblei*), from the Incinerator Project at Rocky Flats Environmental Technology Site (Site). In the Biological Evaluation written for the project it was stated that the revegetation monitoring would be conducted according to the guidance provided in Part II of the Programmatic Biological Assessment, Appendix B. This report is being submitted to satisfy the conditions of the USFWS letter for 2004 and is due by December 1 after each growing season.

Methodology

The methodology used for the monitoring was taken from Appendix B in Part II of the PBA. Both qualitative and quantitative monitoring was conducted at the Incinerator Project Revegetation Area (IPRA) during 2004. Sampling was conducted in mid-August of 2004 during the height of the growing season. Some additional qualitative observations were made in October 2004. Quantitative monitoring was conducted using vegetation transects. Qualitative monitoring was conducted using photographs taken from permanent photopoints and qualitative assessments. A total of three 50-m transects were randomly located within the revegetated area at the IPRA (called IR transects = incinerator revegetation area). Three additional "reference" transects (called IC transects = incinerator control area) were randomly located adjacent to the revegetation area transects. Two transects in the revegetation and reference areas respectively were placed on the hillsides and one was located on the pediment top (Figure 1).

Species richness was determined in a 2-m-wide belt centered along the length of each 50-m transect. Every plant species rooted within the 100-m^2 area was recorded. Foliar cover estimates were made using a point-intercept method along each of the 50-m transects. A 2-m-long rod, with a 6-mm diameter, was dropped vertically at 50-cm increments along the transect to record a total of 100 intercept points. Foliar vegetation hits (defined as a portion of a plant touching the rod) were recorded by species in three categories as defined by height and growth form. The topmost hit of each growth form was recorded. The growth forms measured were herbaceous, woody <2 m in height, and woody >2 m in height.

Determinations of what seeded species were growing within the revegetation areas were made from both the transect data and observations throughout the revegetation areas. Two different seed mixes were applied based on the location within the IPRA. The hillsides were seeded with a mixed grass prairie seed mix consisting of seven native graminoid species (Table 1). The pediment top was seeded with a tallgrass/mixed grass mixture of 11 native graminoid species (Table 2).

Permanent photopoints were established at the beginning of the project and re-photographed after seeding was conducted and during vegetation monitoring activities.

Success criteria for the quantitative vegetation monitoring as outlined in Part II of the PBA, Appendix B are as follows:
1. At least 50% of the seeded species will be present within the revegetation area.
2. The combined foliar cover of grasses, forbs, and shrubs will be at least 80% of the reference area cover.
3. The relative native foliar cover will be at least 50% of the reference area.
4. Noxious weed will not exceed 5% canopy cover in the revegetation areas.

Results and Discussion

Species richness summaries for each of the revegetation and reference area transects at the IPRA are shown in Table 3. Overall species richness was the same for the T1 reference and revegetation transects (35 species each) and differed by only two species at T3 (48 reference vs. 46 revegetation). At T2, the reference transect had nine additional species (38) compared to the revegetation area transect (29). Although in general species richness did not differ greatly between the reference and revegetation areas (except at T3), the percentage of native species was much lower in each of the revegetation areas. The number of noxious weed species was also higher in the revegetation areas compared to the reference areas with the exception of the T1 transects which both had five noxious weed species each. On the hillsides at the IPRA where the T1 and T2 revegetation transects are located a total of seven species of native grasses were seeded in March 2004 (Table - 1). By August 2004, a total of five of these species had germinated and become established on the hillside (western wheatgrass [*Agropyron smithii*], slender wheatgrass [*Agropyron caninum* [=*A. trachycaulum*]], buffalo grass [*Buchloe dactlyoides*], blue grama [*Bouteloua gracilis*], and side-oats grama [*Bouteloua curtipendula*]). On the pediment top, a total of 11 species were seeded in March 2004 (Table 2). A total of eight of the seeded species were observed in the revegetation area by the end of the growing season in October 2004 (western wheatgrass, slender wheatgrass, buffalo grass, blue grama, side-oats grama, big bluestem [*Andropogon gerardii*], little bluestem [*Andropogon scoparius*], and sand dropseed [*Sporobolus cryptandra*]). On the pediment top, however, it was difficult to know whether the plant material was that which had been seeded or whether it came up from root stock because this area had simply been scraped off, leaving some of the perennial species root systems intact. The success criteria in the PBA for species richness states that at least 50% of the seeded species need to be present within the revegetation area. In late 2004 71% of the seeded species are present on the hillside areas at the IPRA. On the pediment top 73% of the seeded species were present. So this criterion has already been met.

Foliar cover results are shown in Table 4. The data for the reference and revegetation transects are shown side by side in the table. Total foliar cover (absolute cover) at each of the two reference area transects on the hillsides was 77% (T1 and T2). The total foliar cover on the hillsides within the IPRA was 32% (T1) and 36% (T2). Thus the vegetation on the hillsides in the IPRA does not meet the success criteria of being 80% of that of the reference area. In 2004, the hillsides in the IPRA only had 42% (T1) and 47% (T2) of the total foliar cover found at the reference locations. On the pediment top, the 2004 total foliar cover was 63% in the IPRA. This compared to 78% found in the reference area. Therefore the IPRA on the pediment top does meet the success criteria in 2004 since the total foliar cover is 81% of that in the reference area.

Total native foliar cover (relative cover) on the hillsides was 40% and 30% at the T1 and T2 reference areas, respectively (Table 4). Native cover within the IPRA at the T1 and T2 transects was higher than that of the reference areas, 53% and 50%, respectively. This exceeds the success criteria that states the revegetation area will have native cover that is at least 50% of the reference areas. On the pediment top in the IPRA, the total native cover was 54% compared to 81% in the reference area (67%). This also exceeds the 50% success criteria requirement.

The final success criteria is that no more than 5% cover of noxious weeds be present in the IPRA. Noxious weeds are defined as those species found on the current Colorado state noxious weed list. The total noxious weed cover at all three transects in the IPRA exceeded 5% in 2004 (T1 = 12.5%, T2 = 13.9%, T3 = 23.8; Table 4). Most of this cover comes from two species, diffuse knapweed (*Centaurea diffusa*) and downy brome (*Bromus tectorum*) (Table 4). The high cover amounts for noxious weeds is not unexpected, first, because it is only the first growing season for the IPRA, and second, because of the substantial presence of noxious weeds surrounding the IPRA. Data from the reference locations showed total noxious weed cover values of 2.6% (T3), 9.1% (T1), and 60% (T2; Table 4). Noxious weed cover in the reference areas was due to the presence of diffuse knapweed, downy brome, St. John's-wort (*Hypericum perforatum*), filaree (*Erodium cicutarium*), and field bindweed (*Convolvulus arvensis*) (Table 4). Two of the three reference areas do not meet the 5% criteria either. Therefore it will likely require weed control efforts to reduce and maintain noxious weed cover at less than 5% within the IPRA to meet success criteria.

Photo monitoring results are shown in Figures 2 through 8. The photos begin with the pre-disturbance photos and go through late summer 2004 as the vegetation was establishing. Good establishment of the vegetation was achieved in 2004 in large part due to the above average moisture received.

Conclusions

Post-project completion mitigation monitoring for the Incinerator Project was completed for the 2004 growing season. This is the first monitoring report covering the monitoring results for the first growing season. Success criteria for species richness and total native cover were met at all three transects monitored within the IPRA. Total vegetation cover success criteria were meet only on the pediment top, but was not met on the hillside locations. Noxious weed cover success criteria were not met at any of the three transects. Weed control will be necessary to bring this value within success criteria parameters. Monitoring will be continued in 2005 to evaluate whether the revegetation planting has met all the success criteria. This information will be beneficial in determining the success of the mitigation plantings for this project and for future revegetation and mitigation work at the Site.

Table 1. Mixed Grass Prairie Seed Mix

Hillside Slope Areas (Hillside Areas Or Areas With Slopes Greater Than 10%) Revegetation Seed Mix   Red Map Areas
(Based on 50 seeds/sq.ft.)

This Revegetation Specification Sheet Supercedes All Previous Revegetation Information For RFETS
Date: 1/04

Species	Common Name	Variety	% of Seed Mix	# Seeds Needed	# Seeds/Lb.	# Seeds/Sq. Ft.	Lbs./Acre (PLS)
Graminoids							
Agropyron dasystachyum	Thickspike Wheatgrass	Critana	5	108900	150000	2.5	0.73
Agropyron smithii	Western Wheatgrass	Arriba	23	500940	120000	11.5	4.17
Agropyron trachycaulum	Slender Wheatgrass	San Luis	15	326700	120000	7.5	2.72
Bouteloua curtipendula	Side-Oats Grama	Vaughn	13	283140	190000	6.5	1.49
Bouteloua gracilis	Blue Grama	Hachita	24	522720	710000	12.0	0.74
Buchloe dactyloides	Buffalo Grass	Texoka	10	217800	45000	5.0	4.84
Stipa viridula	Green Needle Grass	Lodorm	10	217800	180000	5.0	1.21
	Total		100	2178000		50.0	15.90

Sq. ft/acre   43560
Seeds/sq. ft.   50
Seeds needed/acre   2178000

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1) This pounds per acre assumes drill-seeding is used. If the seed is to be broadcast, the application rates are to be doubled.

2) PLS = pure live seed. Be sure to specify this to the seed dealer when ordering.

3) The seed is to be certified weed free.

4) Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species).
This allows Site ecologists to examine the seed for purity prior to seeding.

NOTE:
Slender wheatgrass and thickspike wheatgrass have been added to species mix as early successional species.

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231, x3560, or x3687.

Table 2. Tallgrass/Mixed Grassland Seed Mix

Flat Areas (Areas On Pediment Tops* With Slopes Less Than 10%) Revegetation Seed Mix
(Based on 50 seeds/sq.ft.)

Blue Map Areas

This Revegetation Specification Sheet Supercedes All Previous Revegetation Information For RFETS
Date: 1/04

Scientific Name	Common Name	Variety	% of Seed Mix	# Seeds Needed	# Seeds/Lb.	# Seeds/Sq. Ft.	Lbs./Acre (PLS)
Graminoids							
Agropyron smithii	Western Wheatgrass	Arriba	20	435600	120000	10.0	3.63
Agropyron trachycaulum	Slender Wheatgrass	San Luis	10	217800	120000	5.0	1.82
Andropogon gerardii	Big Bluestem	Bonilla	10	217800	130000	5.0	1.68
Andropogon scoparius	Little Bluestem	Aldous	8	174240	225000	4.0	0.77
Bouteloua curtipendula	Side-Oats Grama	Vaughn	15	326700	190000	7.5	1.72
Bouteloua gracilis	Blue Grama	Hachita	15	326700	710000	7.5	0.46
Buchloe dactyloides	Buffalo Grass	Texoka	5	108900	45000	2.5	2.42
Koleria pyrimidata	June Grass		3	65340	2315400	1.5	0.03
Sorghastrum nutans	Indian Grass	Cheyenne	2	43560	120000	1.0	0.36
Sporobolus cryptandra	Sand Dropseed		7	152460	5298000	3.5	0.03
Stipa viridula	Green Needlegrass	Lodorm	5	108900	115000	2.5	0.95
	Total		100	2178000		50.0	13.86

Sq. ft/acre	43560
Seeds/sq. ft.	50
Seeds needed/acre	2178000

1) This pounds per acre assumes drill-seeding is used. If the seed is to be broadcast, the application rates are to be doubled.

2) PLS = pure live seed. Be sure to specify this to the seed dealer when ordering.

3) The seed is to be certified weed free.

4) Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding.

NOTE:
* The pediment tops are the upper flat surface areas throughout the IA.
Slender wheatgrass was added to species mix as an early successional species.

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231, x3560, or x3687.

Table 3. Incinerator Species Richness Summary 2004

Family	Scientific Name	Speccode	Native	Noxious Weed	Reference Area T1	Revegetation T1	Reference Area T2	Revegetation T2	Reference Area T3	Revegetation T3
AMARANTHACEAE	Amaranthus albus L.	AMAL2	N			X				X
AMARANTHACEAE	Amaranthus retroflexus L.	AMRE1	Y							X
ASCLEPIADACEAE	Asclepias viridiflora Raf.	ASVI1	Y				X			
ASTERACEAE	Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	Y		X			X		
ASTERACEAE	Ambrosia psilostachya DC.	AMPS1	Y		X	X		X	X	X
ASTERACEAE	Artemisia campestris L. ssp. caudata (Michx.) Hall & Clem.	ARCA1	Y						X	
ASTERACEAE	Artemisia ludoviciana Nutt. var. ludoviciana	ARLU1	Y		X		X		X	X
ASTERACEAE	Aster falcatus Lindl.	ASFA1	Y		X					
ASTERACEAE	Aster porteri Gray	ASPO1	Y		X				X	X
ASTERACEAE	Carduus nutans L. ssp. macrolepis (Peterm.) Kazmi	CANU1	N	Y	X					
ASTERACEAE	Centaurea diffusa Lam.	CEDI1	N	Y	X	X	X	X	X	X
ASTERACEAE	Cirsium arvense (L.) Scop.	CIAR1	N	Y	X	X			X	
ASTERACEAE	Conyza canadensis (L.) Cronq.	COCA1	Y		X	X			X	X
ASTERACEAE	Dyssodia papposa (Vent) Hitchc.	DYPA1	N			X		X		
ASTERACEAE	Erigeron divergens T. & G.	ERDI1	Y		X				X	
ASTERACEAE	Erigeron flagellaris A. Gray	ERFL1	Y						X	
ASTERACEAE	Grindelia squarrosa (Pursh.) Dun.	GRSQ1	Y		X	X			X	X
ASTERACEAE	Helianthus annuus L.	HEAN1	Y		X	X	X	X	X	X
ASTERACEAE	Kuhnia eupatorioides L.	KUEU1	Y			X				
ASTERACEAE	Lactuca serriola L.	LASE1	N		X	X	X	X	X	X
ASTERACEAE	Liatris punctata Hook.	LIPU1	Y		X				X	X
ASTERACEAE	Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	Y			X		X		X
ASTERACEAE	Scorzonera laciniata L.	SCLA1	N			X				
ASTERACEAE	Senecio spartioides T. & G.	SESP1	Y						X	X
ASTERACEAE	Sonchus arvensis L. ssp. arvensis L.	SOAR1	N	Y		X				
ASTERACEAE	Taraxacum officinale Weber	TAOF1	N					X	X	
ASTERACEAE	Tragopogon dubius Scop.	TRDU1	N		X				X	X
BORAGINACEAE	Cynoglossum officinale L.	CYOF1	N	Y		X				X
BORAGINACEAE	Lithospermum incisum Lehm.	LIIN1	Y						X	X
BRASSICACEAE	Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	N		X	X	X	X	X	X
BRASSICACEAE	Arabis hirsuta (L.) Scop. var. pynocarpa (Hopkins) Rollins	ARHI1	Y						X	
BRASSICACEAE	Camelina microcarpa Andrz. ex DC.	CAMI1	N		X					
BRASSICACEAE	Lesquerella montana (A. Gray) Wats.	LEMO1	Y						X	
BRASSICACEAE	Sisymbrium altissimum L.	SIAL1	N			X	X	X		X
CACTACEAE	Echinocereus viridiflorus Engelm.	ECVI1	Y				X		X	
CACTACEAE	Opuntia macrorhiza Engelm.	OPMA1	Y		X		X		X	X
CARYOPHYLLACEAE	Arenaria fendleri A. Gray	ARFE2	Y						X	
CARYOPHYLLACEAE	Silene antirrhina L.	SIAN1	Y						X	
CHENOPODIACEAE	Chenopodium album L.	CHAL1	N			X		X	X	X
CHENOPODIACEAE	Chenopodium botrys L.	CHBO1	N							X
CHENOPODIACEAE	Chenopodium leptophyllum Nutt. ex Moq.	CHLE2	Y					X		
CHENOPODIACEAE	Kochia scoparia (L.) Schrad.	KOSC1	N			X		X		X
CHENOPODIACEAE	Salsola iberica Senn. & Pau.	SAIB1	N					X		X
CLUSIACEAE	Hypericum perforatum L.	HYPE1	N	Y	X				X	X
CONVOLVULACEAE	Convolvulus arvensis L.	COAR1	N	Y			X			
CYPERACEAE	Carex heliophila Mack.	CAHE1	Y			X			X	
CYPERACEAE	Carex praegracilis W. Boott.	CAPR1	Y		X					
EUPHORBIACEAE	Euphorbia dentata Michx.	EUDE1	Y				X	X		X
FABACEAE	Dalea purpurea Vent	DAPU1	Y						X	X
FABACEAE	Glycyrrhiza lepidota Pursh.	GLLE1	Y		X					
FABACEAE	Medicago sativa L. ssp. sativa	MESA1	N					X		
FABACEAE	Melilotus officinalis (L.) Pall.	MEOF1	N		X	X	X	X		X
FABACEAE	Psoralea tenuiflora Pursh.	PSTE1	Y		X		X		X	X
GERANIACEAE	Erodium cicutarium (L.) L'Her.	ERCI1	N	Y			X	X		X
LAMIACEAE	Lycopus americanus Muhl. ex Barton	LYAM1	Y		X					
LAMIACEAE	Marrubium vulgare L.	MAVU1	N			X	X	X		X

Table 3. Cont.

Family	Scientific Name	Speccode	Native	Noxious Weed	Reference Area T1	Revegetation T1	Reference Area T2	Revegetation T2	Reference Area T3	Revegetation T3
LILIACEAE	Allium textile A. Nels. & Macbr.	ALTE1	Y						X	
LINACEAE	Linum perenne L. var. lewisii (Pursh.) Eat. & Wright	LIPE1	Y					X		
NYCTAGINACEAE	Mirabilis linearis (Pursh.) Heimerl	MILI1	Y				X			X
PAPAVERACEAE	Argemone polyanthemos (Fedde) G. Ownbey	ARPO1	Y					X		
PLANTAGINACE	Plantago lanceolata L.	PLLA1	N					X		
POACEAE	Aegilops cylindrica Host	AECY1	N	Y		X				X
POACEAE	Agropyron caninum (L.) Beauv. ssp. majus (Vasey) C. L. Hitchc.	AGCA1	Y			X		X		X
POACEAE	Agropyron intermedium (Host) Beauv.	AGIN1	N						X	
POACEAE	Agropyron smithii Rydb.	AGSM1	Y		X	X	X	X		
POACEAE	Andropogon gerardii Vitman	ANGE1	Y			X			X	X
POACEAE	Andropogon scoparius Michx.	ANSC1	Y						X	X
POACEAE	Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	Y				X.		X	X
POACEAE	Avena fatua var. sativa (L.) Hausskn.	AVFA1	N					X		
POACEAE	Bouteloua curtipendula (Michx.) Torr.	BOCU1	Y				X		X	
POACEAE	Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	Y		X	X	X		X	X
POACEAE	Bouteloua hirsuta Lag	BOHI1	Y						X	
POACEAE	Bromus inermis Leyss. ssp. inermis	BRIN1	N		X					
POACEAE	Bromus japonicus Thunb. ex Murr.	BRJA1	N		X	X		X	X	X
POACEAE	Bromus tectorum L.	BRTE1	N	Y	X	X	X	X	X	X
POACEAE	Buchloe dactyloides (Nutt.) Engelm.	BUDA1	Y		X	X				X
POACEAE	Echinochloa crusgallii (L.) Beauv.	ECCR1	N			X		X		
POACEAE	Festuca ovina L. var. rydbergii St. Yves	FEOV1	Y						X	
POACEAE	Festuca pratensis Huds.	FEPR1	Y					X		
POACEAE	Hordeum jubatum L.	HOJU1	Y					X		
POACEAE	Koeleria pyramidata (Lam.) Beauv.	KOPY1	Y		X				X	
POACEAE	Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	Y			X			X	X
POACEAE	Panicum capillare L.	PACA1	Y					X		X
POACEAE	Poa compressa L.	POCO1	N		X				X	X
POACEAE	Poa pratensis L.	POPR1	N		X					
POACEAE	Setaria viridis (L.) Beauv.	SEVI1	N					X		
POACEAE	Sitanion hystrix (Nutt.) Sm. var. brevifolium (Sm.) Hitchc.	SIHY1	Y			X		X		
POACEAE	Sporobolus asper (Michx.) Kunth	SPAS1	Y				X			X
POACEAE	Stipa comata Trin. & Rupr.	STCO1	Y				X			
POLYGONACEAE	Polygonum arenastrum Jord. ex Bor.	POAR1	N			X		X		
POLYGONACEAE	Polygonum convolvulus L.	POCO2	N			X				
POLYGONACEAE	Polygonum ramosissimum Michx.	PORA1	Y			＼		X		
PORTULACACEAE	Talinum parviflorum Nutt.	TAPA1	Y						X	
ROSACEAE	Potentilla gracilis Dougl. ex Hook. var. glabrata (Lehm.) C. L. Hitchc.	POGR1	Y		X					
SCROPHULARIACEAE	Castilleja sessiliflora Pursh.	CASE3	Y						X	
SCROPHULARIACEAE	Linaria dalmatica (L.) Mill.	LIDA1	N	Y		X				
SCROPHULARIACEAE	Verbascum thapsus L.	VETH1	N	Y	X	X	X	X		X
SOLANACEAE	Physalis heterophylla Nees	PHHE2	Y					X		X
SOLANACEAE	Solanum rostratum Dun.	SORO1	Y					X		X
VERBENACEAE	Lippia cuneifolia (Torr.) Steud.	LICU1	Y		X	X				
VERBENACEAE	Verbena bracteata Lag. & Rodr.	VEBR1	Y					X		X
	Unknown	UNKN				X				
	Total # Species				35	35	38	29	48	46
	Percent Native Species				60	29	66	45	74	58
	# of Noxious Weed Species				5	5	4	9	4	7

Table 4. Incinerator Foliar Cover Summary 2004

Scientific Name	Speccode	Growth Form	Native	Cool\Warm Season	Noxious Weed	Reference Area T1		Revegetation T1		Reference Area T2		Revegetation T2		Reference Area T3		Revegetation T3	
						Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)	Absolute Cover (%)	Relative Cover (%)
Alyssum minus (L.) Rothmaler var. micranthus (C. A. Mey.) Dudley	ALMI1	F	N			1	1.30			5	6.49			2	2.56	1	1.59
Centaurea diffusa Lam.	CEDI1	F	N		Y	1	1.30	1	3.13			5	13.89			6	9.52
Cirsium arvense (L.) Scop.	CIAR1	F	N		Y	6	7.79										
Convolvulus arvensis L.	COAR1	F	N		Y					25	32.47						
Erodium cicutarium (L.) L'Her.	ERCI1	F	N		Y					1	1.30					1	1.59
Hypericum perforatum L.	HYPE1	F	N		Y									1	1.28		
Kochia scoparia (L.) Schrad.	KOSC1	F	N									1	2.78				
Lactuca serriola L.	LASE1	F	N			1	1.30	2	6.25	1	1.30					3	4.76
Melilotus officinalis (L.) Pall.	MEOF1	F	N			2	2.60	6	18.75			11	30.56			7	11.11
Salsola iberica Senn. & Pau.	SAIB1	F	N													1	1.59
Scorzonera laciniata L.	SCLA1	F	N							1	3.13						
Sisymbrium altissimum L.	SIAL1	F	N							1	1.30					1	1.59
Tragopogon dubius Scop.	TRDU1	F	N													1	1.59
Verbascum thapsus L.	VETH1	F	N		Y					1	1.30						
Achillea millefolium L. ssp. lanulosa (Nutt.) Piper	ACMI1	F	Y									1	2.78				
Ambrosia psilostachya DC.	AMPS1	F	Y			1	1.30	1	3.13			2	5.56	1	1.28	6	9.52
Aster porteri Gray	ASPO1	F	Y			1	1.30							10	12.82		
Erigeron flagellaris A. Gray	ERFL1	F	Y											11	14.10		
Helianthus annuus L.	HEAN1	F	Y					1	3.13			1	2.78			1	1.59
Liatris punctata Hook.	LIPU1	F	Y											1	1.28		
Lippia cuneifolia (Torr.) Steud.	LICU1	F	Y			1	1.30										
Lithospermum incisum Lehm.	LIIN1	F	Y											1	1.28		
Physalis heterophylla Nees	PHHE2	F	Y													1	1.59
Psoralea tenuiflora Pursh.	PSTE1	F	Y							4	5.19					3	4.76
Ratibida columnifera (Nutt.) Woot. & Standl.	RACO1	F	Y									1	2.78				
Verbena bracteata Lag. & Rodr.	VEBR1	F	Y									1	2.78				
Aegilops cylindrica Host	AECY1	G	N	C	Y											1	1.59
Agropyron intermedium (Host) Beauv.	AGIN1	G	N	C										2	2.56		
Bromus inermis Leyss. ssp. inermis	BRIN1	G	N	C		3	3.90										
Bromus japonicus Thunb. ex Murr.	BRJA1	G	N	C		9	11.69	2	6.25					2	2.56		
Bromus tectorum L.	BRTE1	G	N	C	Y			3	9.38	20	25.97			1	1.28	7	11.11
Poa compressa L.	POCO1	G	N	C		16	20.78							7	8.97		
Poa pratensis L.	POPR1	G	N	C		7	9.09										
Setaria viridis (L.) Beauv.	SEVI1	G	N	W								1	2.78				
Agropyron caninum (L.) Beauv. ssp. majus (Vasey) C. L. Hitchc.	AGCA1	G	Y	C				9	28.13			7	19.44			1	1.59
Agropyron smithii Rydb.	AGSM1	G	Y	C		26	33.77	3	9.38								
Aristida purpurea Nutt. var. robusta (Merrill) A. Holmgren & N. Holmgr	ARLO1	G	Y	C						2	2.60			3	3.85		
Carex heliophila Mack.	CAHE1	G	Y	C						1	1.30						
Koeleria pyramidata (Lam.) Beauv.	KOPY1	G	Y	C		1	1.30										
Stipa comata Trin. & Rupr.	STCO1	G	Y	C						6	7.79						
Andropogon gerardii Vitman	ANGE1	G	Y	W						8	10.39			14	17.95		
Bouteloua curtipendula (Michx.) Torr.	BOCU1	G	Y	W						1	1.30						
Bouteloua gracilis (H. B. K.) Lag ex Griffiths	BOGR1	G	Y	W		1	1.30			1	1.30						
Buchloe dactyloides (Nutt.) Engelm.	BUDA1	G	Y	W				3	9.38							1	1.59
Muhlenbergia montana (Nutt.) Hitchc.	MUMO1	G	Y	W										22	28.21		
Panicum capillare L.	PACA1	G	Y	W								5	13.89			21	33.33
Total Foliar Cover						77	100.00	32	100.00	77	100.00	36	100.00	78	100.00	63	100.00
Total Forb Cover						14	18.18	12	37.50	38	49.35	23	63.89	27	34.62	32	50.79
Total Non-Native Forb Cover						11	14.29	10	31.25	34	44.16	17	47.22	3	3.85	21	33.33
Total Native Forb Cover						3	3.90	2	6.25	4	5.19	6	16.67	24	30.77	11	17.46
Total Graminoid Cover						63	81.82	20	62.50	39	50.65	13	36.11	51	65.38	31	49.21
Total Non-Native Graminoid Cover						35	45.45	5	15.63	20	25.97	1	2.78	12	15.38	8	12.70
Total Native Graminoid Cover						28	36.36	15	46.88	19	24.68	12	33.33	39	50.00	23	36.51
Total Native Cover						31	40.26	17	53.13	23	29.87	18	50.00	63	80.77	34	53.97
Total Non-Native Cover						46	59.74	15	46.88	54	70.13	18	50.00	15	19.23	29	46.03
Total Warm-Season Graminoid Cover						1	1.30	3	9.38	10	12.99	6	16.67	36	46.15	22	34.92
Total Cool-Season Graminoid Cover						62	80.52	17	53.13	29	37.66	7	19.44	15	19.23	9	14.29
Total Noxious Weed Cover						7	9.09	4	12.50	47	61.04	5	13.89	2	2.56	15	23.81

Absolute Cover = The percentage of the number of hits on a species out of the total number of hits possible.
Relative Cover = The percentage of the number of hits on a species out of the total number of vegetation hits.
Native Categories: Y = Native, N = Non-Native
Growth Form Categories: F = Forb, G = Graminoid
Cool/Warm Season Categories: C = Cool-Season Graminoid, W = Warm-Season Graminoid
Noxious Weed Category: Y = Noxious Weed (listed on May 2004 Colorado State Noxious Weed List)

Incinerator Project Revegetation Monitoring Transects 2004

Figure 1

Legend

- ▭ Incinerator Project Revegetation Areas
- # Transect Endpoints

Standard Features

- ▢ Buildings
- ▢ Demolished Buildings
- ■ Lakes & ponds
- — Streams & ditches
- ---- Fences
- ═ Paved roads
- — Dirt roads
- ⋯ Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas Digitized from the orthophotographs, 1/95

N

100   0   100   200 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0053

October 6, 2004

IC3 0M — IC3 50M

IR3 0M — IRC 50M

IR2 50M

IC2 50M

IR2 0M

IC2 0M

IR1 0M

IC1 0M

IR1 50M

IC1 50M

2075000   2080000   2085000   2090000

755000
750000
745000

NOTE:
Transect Names: IC = Reference Area Transects,
IR = Revegetation Area Transects

Example: IC1 0M = Transect #1 in Reference Area
0 meter endpoint

Figure 2. Incinerator Photos A
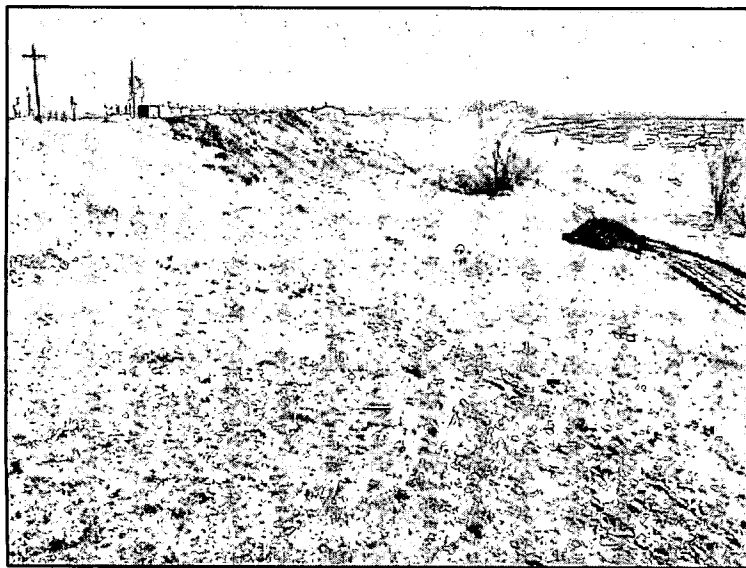
March 2003

March 2004

August 2004

Figure 3. Incinerator Photos B

March 2003

March 2004
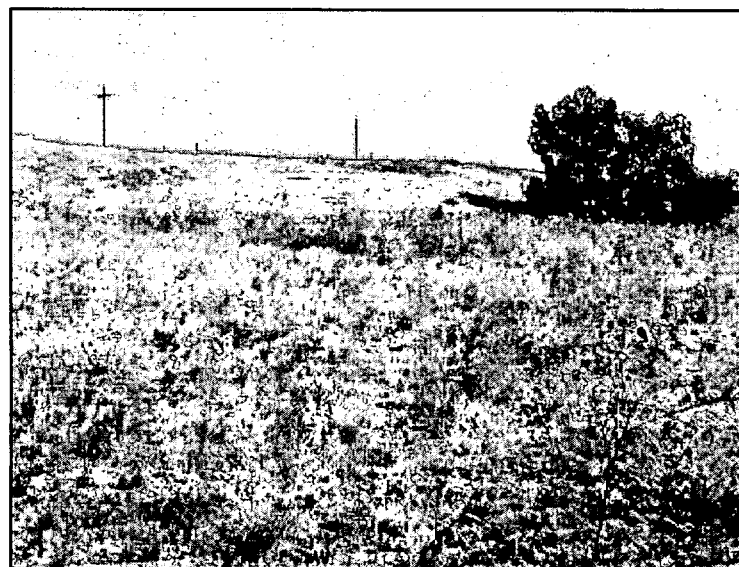
August 2004

Figure 4. Incinerator Photos C
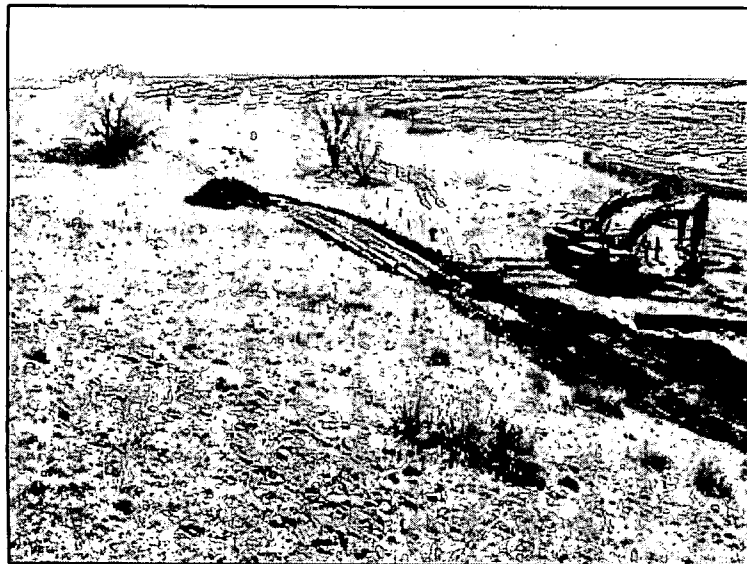
March 2003

March 2004

August 2004

Figure 5. Incinerator Photos D
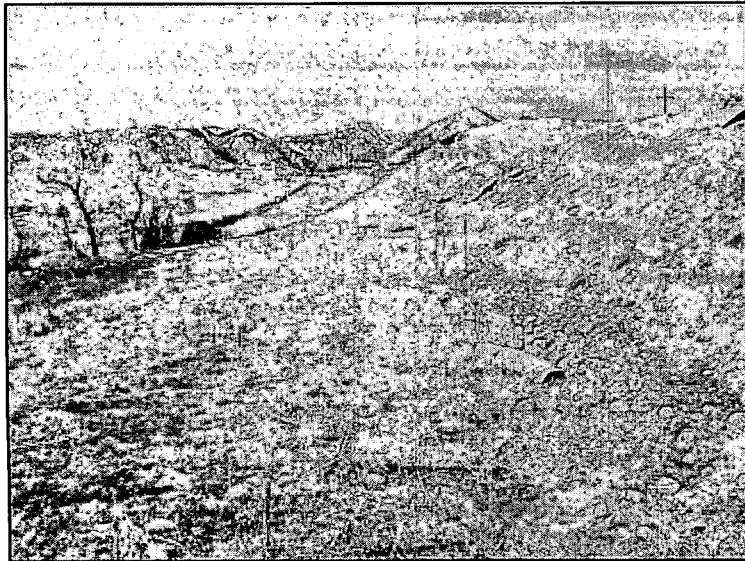
March 2003
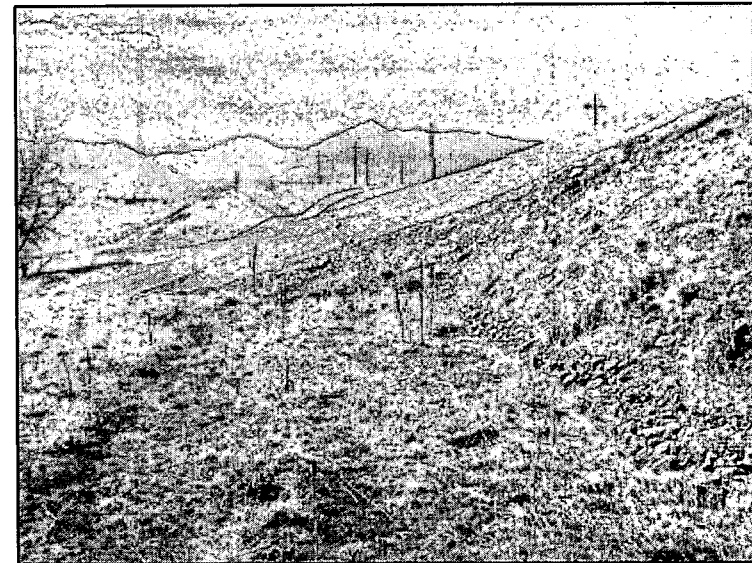
March 2004
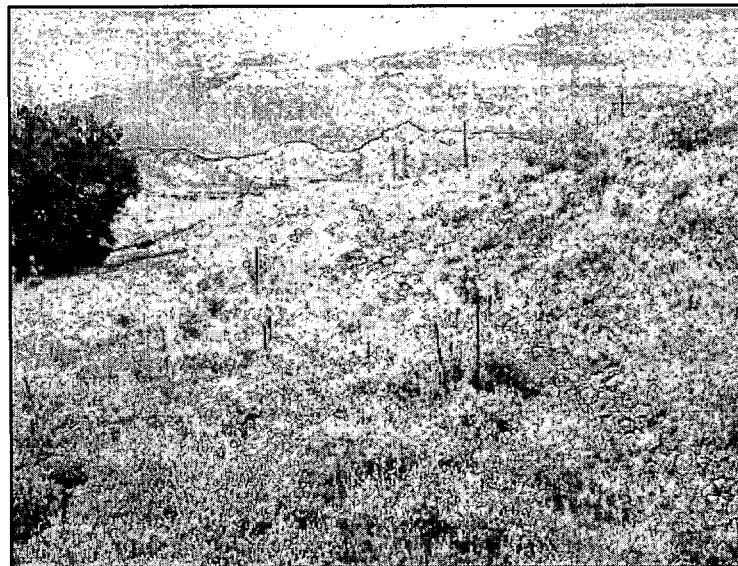
August 2004

Figure 6. Incinerator Photos E
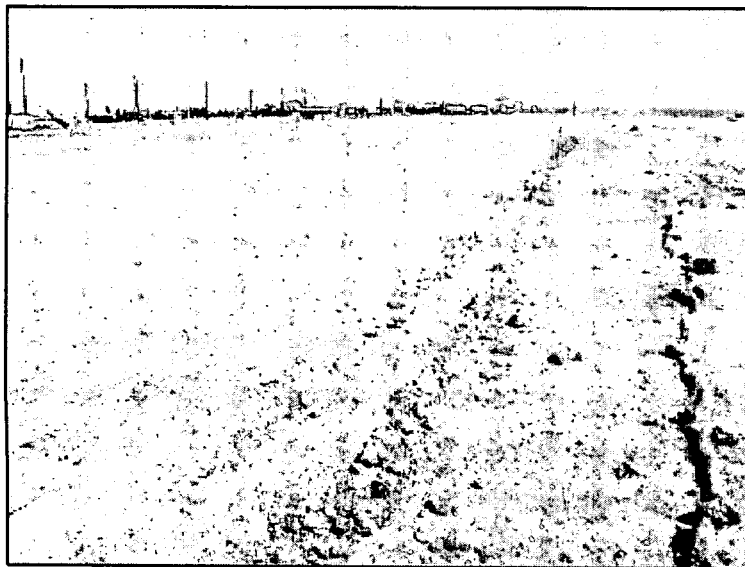
March 2004

August 2004

Figure 7. Incinerator Photos F

March 2004
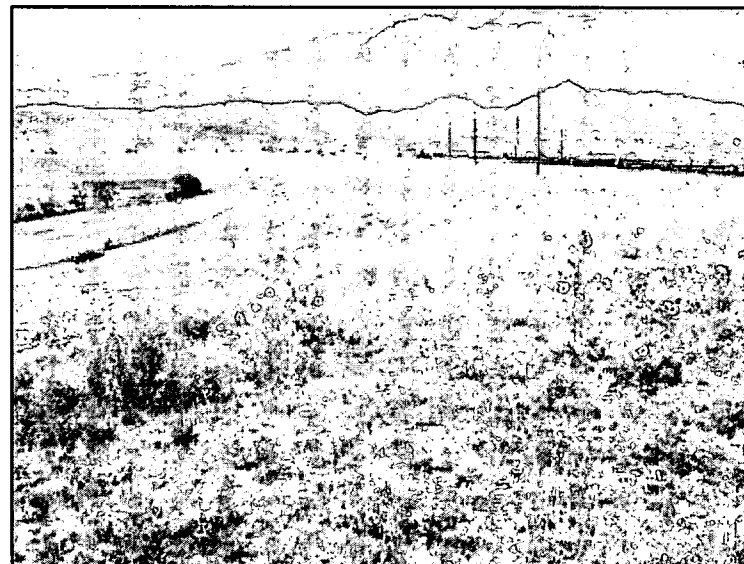
August 2004

Figure 8. Incinerator Photos G
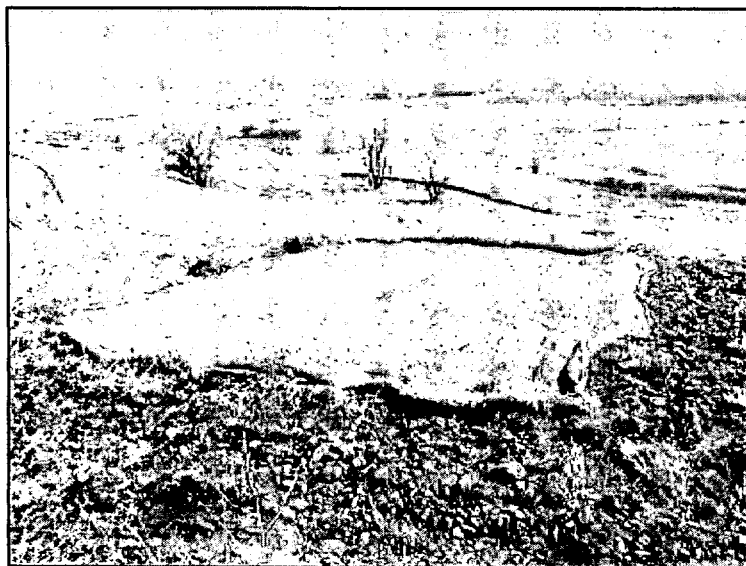
March 2004

August 2004

Part II, PBA Report

* PDF Version of Report

* Appendix A - PMJM Mitigation Tracking Spreadsheet and Maps

* Appendix B - Photo Monitoring Results

* Appendix C - Qualitative Revegetation Evaluation Forms

Preble's Mouse Mitigation Monitoring Report for the Programmatic Biological Opinion at the Rocky Flats Environmental Technology Site 2004 Annual Report Biological Opinion: ES/LK-6-CO-04-F-012

Table of Contents

Introduction

This report is being submitted to the United States Fish and Wildlife Service (USFWS) in accordance with the requirements outlined in the USFWS Biological Opinion (BO) for the Programmatic Biological Assessment Part II (PBA Pt. II). The BO addresses impacts to the federally-listed Preble's meadow jumping mouse, (Preble's mouse, *Zapus hudsonius preblei*), from various cleanup and closure projects at the Rocky Flats Environmental Technology Site (Site). The BO specifies under the Terms and Conditions (3a) that an annual report containing the annual monitoring information on restoration and enhancement efforts shall be submitted to the USFWS by December 1 after each growing season. This report is being submitted to satisfy this condition of the BO.

Methodology

The methodology used for the monitoring was taken from Appendix B in Part II of the PBA, the Mitigation Monitoring Plan. Per the plan, qualitative and/or quantitative monitoring will be used for monitoring revegetation efforts dependent on the size of the migitation area. For areas larger than one acre in size, quantitative monitoring will be conducted. For areas less than one acre in size qualitative monitoring will be used. The PBA states that qualitative monitoring will be conducted for a minimum of three growing seasons after project completion. After three growing seasons, the United States Department of Energy (DOE) and the USFWS will meet to evaluate the success of the revegetation area..

At the time of preparation of this report, no Part II PBA projects disturbed areas larger than one acre. Therefore qualitative assessments in addition to photographs were used to evaluate revegetation efforts. Additionally, qualitative pre-impact assessments consisting of photo monitoring was conducted at applicable Part II PBA project locations that are scheduled to begin in the next year. Assessments were conducted during the late summer in 2004.

Qualitative assessments consisted of completing a Qualitative Revegetation Evaluation Form (QREF) and taking a minimum of two photographs of each project area. An example of the QREF is found in Figure 1.

Results and Discussion

Table 1 lists the projects included in this report from Part II of the PBA and what type of monitoring was conducted for each of them during 2004. The GIS Reference # column identifies the project on the mitigation tracking spreadsheet on the CD-ROM (Appendix A). Figure 2 shows the general locations of these projects. For disturbance acreages and project specific GIS maps see the Preble's mouse mitigation tracking spreadsheet and associated figures on the CD-ROM (Appendix A). Photo-monitoring results (Appendix B) and copies of the original QREFs (Appendix C) for each project are also found on the CD-ROM.

Two ground water monitoring wells were drilled along Woman Creek during 2004 to support remediation project monitoring requirements. Additionally, three geoprobe bore holes were also made to determine the best location for one of the wells. The two monitoring wells were capped with steel casings. Little disturbance beyond trampling of the vegetation occurred at any of the locations. No revegetation was necessary at the locations because the pre-existing vegetation was coming back up in abundance. These areas look good and by next summer it will be hard to see where the disturbances took place.

At the Original Landfill Project, geotechnical sampling and hotspot removals were conducted during 2004. Two small areas disturbed were outside of the original construction footprint assigned to the project. Erosion controls (hay bales and erosion mattes) were placed on each of the disturbances. One of the locations (T6) was reseeded with the hillslope seed mix from the *RFETS Revegetation Plan* (Rev. 2; Table 2). The other areas were not reseeded because they were going to be disturbed within the next few months when the project starts larger scale operations. In early September 2004, three seeded species (western wheatgrass [*Agropyron smithi*], slender wheatgrass [*Agropyron caninum = A. trachycaulum*], and blue grama [*Bouteloua gracilis*]) were establishing at the T6 location. Some non-native species such as smooth brome (*Bromus inermis*) and

Canada thistle (*Cirsium arvense*) were also beginning to come up. Some spraying of the Canada thistle with Roundup was conducted to try and keep it out of the revegetation area.

Several old culverts were removed from a location in Woman Creek south of the B130 building area during 2004. The project area disturbance consisted simply of trampled vegetation and some small soil disturbance resulting from the trackhoe used to remove the culverts from the stream. The area was reseeded using the hillslope seed mix from the *RFETS Revegetation Plan* (Rev. 2; Table 2). No erosion controls were installed because the original vegetation was still present and little actual disturbance to the ground was done. The vegetation in the area has already begun to return to normal, most of it coming from the pre-existing vegetation.

The OPWL project, an unforeseen project, disturbed an area on the east and west sides of the North Access Road near the Waste Water Treatment Plant in 2004. The project removed some underground pipelines. On the east side of the road after the project was completed, the area was seeded with the hillslope seed mix mentioned above and hydromulched, and a straw wattle was placed and staked along the southern side of the disturbance. Many of the seeded species including slender wheatgrass, western wheatgrass, buffalo grass, side-oats grama, and blue grama have already come up and are establishing well. Some weeds such as diffuse knapweed, bindweed (*Convolulus arvense*), musk thistle (*Carduus nutans*), and common mullein (*Verbascum thapsus*) are starting to invade along with the non-native grasses, crested wheatgrass (*Agropyron cristatum*) and smooth brome (*Bromus inermis*) both which dominate the surrounding landscape. On the west side of the road the area was also seeded with the hillslope seed mix and straw wattles and hay bales used for erosion control. Many of the seeded species including slender wheatgrass, blue grama, side-oats grama, buffalo grass, and even some big bluestem (which was not in the mix) have established. Some weeds such as bindweed, mullein, diffuse knapweed, and kochia are also present along with some smooth brome. Both the east and west areas have greater than 60% vegetation cover already. The above average precipitation received in summer 2004 has benefited most of the revegetation areas at the Site.

Pre-disturbance photo monitoring was conducted for the Original Landfill Project, Pond Remediation and Removal Project, Surface Water Monitoring Equipment Removal Project, North Access Road and Culvert Removal Project, and Waste Water Treatment Plant Removal Project. These photographs document the landscape character of each of the project areas prior to major project activities. The photographs can be used as a time-series for comparison to future photographs taken from the same locations. This series of photo-monitoring can also be found on the CD-ROM (Appendix B).

Conclusions

Post-project completion revegetation monitoring and pre-disturbance monitoring for several of the projects included in Part II of the PBA were conducted in 2004. Initial results have shown many of the seeded plant species have germinated and begun to establish. Some of the locations have some noxious weed issues which will be addressed through weed control. In general, the revegetation status is what would be expected for the first growing season. Monitoring will continue in 2005.

Table 1. Part II PBA Project Monitored in 2004

GIS Reference #	Project Description	Qualitative Revegetation Evaluation Form	Photo-Monitoring	Pre-Disturbance Photo-Monitoring
J	Monitoring Well Installations	X	X	
G	Original Landfill Project	X	X	X
K - L	Pond Remediation and Removal			X
NA	Surface Water Monitoring Equipment Removal			X
I	North Access Road and Culvert Removal	X	X	X
NA	Waste Water Treatment Plant Removal			X
A - F	OPWL Project	X	X	

NA – not applicable in 2004

Table 2. Mixed Grass Prairie Seed Mix

Hillside Slope Areas (Hillside Areas Or Areas With Slopes Greater Than 10%) Revegetation Seed Mix   Red Map Areas
(Based on 50 seeds/sq.ft.)

This Revegetation Specification Sheet Supercedes All Previous Revegetation Information For RFETS
Date: 1/04

Species	Common Name	Variety	% of Seed Mix	# Seeds Needed	# Seeds/Lb.	# Seeds/Sq. Ft.	Lbs./Acre (PLS)
Graminoids							
Agropyron dasystachyum	Thickspike Wheatgrass	Critana	5	108900	150000	2.5	0.73
Agropyron smithii	Western Wheatgrass	Arriba	23	500940	120000	11.5	4.17
Agropyron trachycaulum	Slender Wheatgrass	San Luis	15	326700	120000	7.5	2.72
Bouteloua curtipendula	Side-Oats Grama	Vaughn	13	283140	190000	6.5	1.49
Bouteloua gracilis	Blue Grama	Hachita	24	522720	710000	12.0	0.74
Buchloe dactyloides	Buffalo Grass	Texoka	10	217800	45000	5.0	4.84
Stipa viridula	Green Needle Grass	Lodorm	10	217800	180000	5.0	1.21
	Total		100	2178000		50.0	15.90

Sq. ft/acre	43560
Seeds/sq. ft.	50
Seeds needed/acre	2178000

1) This pounds per acre assumes drill-seeding is used. If the seed is to be broadcast, the application rates are to be doubled.

2) PLS = pure live seed. Be sure to specify this to the seed dealer when ordering.

3) The seed is to be certified weed free.

4) Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding.

NOTE:
Slender wheatgrass and thickspike wheatgrass have been added to species mix as early successional species.

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231, x3560, or x3687.

Figure 1.

Qualitative Revegetation Evaluation Form   Form #_____

Date_____
Observer(s)_____
Location ID_____

Photographs taken today?   Y   N

Are seeded plant species present?   Y   N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

_____
_____
_____
_____
_____
_____
_____

Any evidence of nutrient or water deficiencies? If so, describe. _____
_____
_____
_____

Are noxious weeds present?   Y   N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

_____
_____
_____
_____
_____
_____
_____
_____
_____

Are other weedy species present?   Y   N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

_____
_____
_____
_____
_____
_____
_____
_____

Total Vegetation Cover (Estimate to nearest percent) _____

Suggestions for management:_____
_____
_____
_____
_____
_____

Other comments:_____
_____
_____
_____
_____
_____

Completed by:_____Date_____
                   Print   Sign

Programmatic Biological
Assessment Part II
Monitoring Activities
2004

Figure 2

Pond Remediation and
Removal [A-Series Ponds]

North Access Road and Culvert Removal

Pond Remediation and
Removal [B-Series Ponds]

OPWL

Waste Water Treatment Plant

Pond Remediation and
Removal [C-Series Ponds]

Original Landfill Project

Monitoring Well Installations

PBA Pt. II Project Footprints

PBA Pt. II Project
Disturbances 2004

Standard Features

Buildings
Demolished Buildings
Lakes & ponds
Streams & ditches
Fences
Paved roads
Dirt roads
Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other
structures from 1994 aerial fly-over data
captured by EG&G RSL, Las Vegas
Digitized from the orthophotographs, 1/95

N

600   0   600   1200 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared
by: Professional Environmental Group, L.L.C.

For: RFETS GIS Dept.
                                  303-966-7707
              Kaiser-Hill
              Company, LLC

MAP ID: 05-0002   October 13, 2004

Preble's Mouse Mitigation Debit/Credit Spreadsheet*

Preble's Meadow Jumping Mouse Mitigation Tracking Spreadsheet for Part II activities in the PBA

GIS Ref #	Date Project Initiated	Date Project Completed	Project Description	Impacted Acres	Mitigation Ratio	Acres to Mitigate	Mitigation Project	Total Debit (-) Acres	Date Mitigation Initiated	Mitigation Agency Concurrence Date	Total Credit (+) Acres	Debit (-)/ Credit (+)	Comment
A	5/3/2004	5/12/2004	OPWL east	0.0141 Lower Quality / 0.0 Higher Quality	1.5 : 1 / 2 : 1	0.0212 / 0.0	Road and Culvert Removals	-0.0212	5/12/2004		[0.0141]	-0.0212	
B	5/3/2004	5/12/2004	OPWL east	0.0658 Lower Quality / 0.0 Higher Quality	1.5 : 1 / 2 : 1	0.0987 / 0.0	Miscellaneous	-0.0987	5/12/2004		[0.0658]	-0.0987	
C	5/3/2004	5/12/2004	OPWL east	0.0111 Lower Quality / 0.0 Higher Quality	1.5 : 1 / 2 : 1	0.0167 / 0.0	Pond Remediation and Removal Projects	-0.0167	5/12/2004		[0.0111]	-0.0167	
D	5/17/2004	5/25/2004	OPWL west	0.0147 Lower Quality / 0.0 Higher Quality	1.5 : 1 / 2 : 1	0.0221 / 0.0	Waste Water Treatment Plant	-0.0221	5/25/2004		[0.0147]	-0.0221	
E	5/17/2004	5/25/2004	OPWL west	0.0073 Lower Quality / 0.0 Higher Quality	1.5 : 1 / 2 : 1	0.0110 / 0.0	Miscellaneous	-0.0110	5/25/2004		[0.0073]	-0.0110	
F	5/17/2004	5/25/2004	OPWL west	0.0305 Lower Quality / 0.0 Higher Quality	1.5 : 1 / 2 : 1	0.0458 / 0.0	Road and Culvert Removals	-0.0458	5/25/2004		[0.0305]	-0.0458	
G	6/17/2004	6/28/2004	OLF Geotechnical Sampling	0.1375 Lower Quality / 0.0472 Higher Quality	1.5 : 1 / 2 : 1	0.2063 / 0.0944	Original Landfill Project	-0.3007	6/28/2004		[0.1275]	-0.3007	
H	5/3/2004	6/17/2004	2004 Herbicide Applications		60:1		2004 Herbicide Applications (30 acres/annually for 3 yrs to offset 0.51 acres mitigation needed)		5/3/2004		0.170	0.1700	
I	7/12/2004	7/20/2004	Culvert Removal Woman Creek	0.0390 Lower Quality / 0.0341 Higher Quality	1.5 : 1 / 2 : 1	0.0585 / 0.0682	Road and Culvert Removals	-0.1267	7/20/2004		[0.0731]	-0.1267	
J	7/6/2004	7/28/2004	Well Installations	0.00 Lower Quality / 0.0645 Higher Quality	1.5 : 1 / 2 : 1	0.00 / 0.1290	Well Installations	-0.1290	8/3/2004		[0.0645]	-0.1290	Polygon modified from original 8/3/04 data due to error.
K	8/30/2004		B Pond Remediation	0.1642 Lower Quality / 0.00 Higher Quality	1.5 : 1 / 2 : 1	0.2463 / 0.00	Road and Culvert Removals	-0.2463			[0.1642]	-0.2463	
L	8/30/2004		B Pond Remediation	0.0005 Lower Quality / 0.00 Higher Quality	1.5 : 1 / 2 : 1	0.0008 / 0.00	Miscellaneous	-0.0008			[0.0005]	-0.0008	
							Total Acreage	-1.0190			0.743	-0.8490	

NOTE: Only acreage values greater than 0.0002 acres are incorporated in this spreadsheet. The reason is that the GPS unit being used becomes inaccurate for polygons smaller than this.
In the Total Credit column the brackets indicate that the credit has not been applied yet. After USFWS concurrence for that project, the brackets will be removed and the credits applied.

Rocky Flats Environmental Technology Site
Programmatic Biological Assessment
Disturbance Tracking
September 8, 2004

Legend

■ Current Preble's Protection Areas

▨ Project Footprints for PBA Part II Activities

▨ Project Disturbances (Letter match projects on spreadsheet)

Standard Features

☐ Buildings
☐ Demolished Buildings
■ Lakes & ponds
— Streams & ditches
---- Fences
═══ Paved roads
— Dirt roads
— Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs, 1/95.

N

500   0   500   Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035   September 8, 2004

A, B, C, D, E, F, K, L

G, J

I

J

Rocky Flats Environmental Technology Site Programmatic Biological Assessment Disturbance Tracking

June 1, 2004

Legend

- **Current Preble's Protection Areas**
- **Project Footprints for PBA Part II Activities**
- **Project Disturbances** (Letter match projects on spreadsheet)

Standard Features

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other
structures from 1994 aerial fly-over data
captured by EG&G RSL, Las Vegas.
Digitized from the orthophotographs. 1/95

N

25   0   25 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

**U.S. Department of Energy
Rocky Flats Environmental Technology Site**

Prepared by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill Company, LLC

RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035

June 1, 2004

2075000 2080000 2085000 2090000

755000

750000

745000

Original Landfill Project Area

South Interceptor Ditch

G

Rocky Flats Environmental Technology Site Programmatic Biological Assessment Disturbance Tracking

July 1, 2004

Legend

- ■ Current Preble's Protection Areas
- ▨ Project Footprints for PBA Part II Activities
- ▨ Project Disturbances (Letter match projects on spreadsheet)

Standard Features

- ☐ Buildings
- ☐ Demolished Buildings
- ■ Lakes & ponds
- — Streams & ditches
- ---- Fences
- ═ Paved roads
- — Dirt roads
- — Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas
Digitized from the orthophotographs, 1/95

N

200   0   200 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill Company, LLC   RFETS GIS Dept. 303-966-7707

MAP ID: 04-0035   July 1, 2004

Rocky Flats Environmental Technology Site Programmatic Biological Assessment Disturbance Tracking — September 8, 2004

Legend

- Current Preble's Protection Areas
- Project Footprints for PBA Part II Activities
- Project Disturbances (Letter match projects on spreadsheet)

Standard Features
- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the orthophotographs, 1/95

N

500   0   500 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill Company, LLC
RFETS GIS Dept.
303-966-7707

MAP ID: 04-0035   September 8, 2004

Culvert Removal Project (I)

Well Installations (J)

Rocky Flats Environmental
Technology Site
Programmatic Biological
Assessment
Disturbance Tracking

September 8, 2004

Legend

■ Current Preble's Protection Areas

▨ Project Footprints for
PBA Part II Activities

▨ Project Disturbances
(Letter match projects
on spreadsheet)

Standard Features

▢ Buildings
▢ Demolished Buildings
■ Lakes & ponds
— Streams & ditches
----- Fences
=== Paved roads
— Dirt roads
— Contours (20 ft. intervals)

DATA SOURCE BASE FEATURES:
Buildings, fences, hydrography, roads and other
structures from 1994 aerial fly-over data
captured by EG&G RSL, Las Vegas
Digitized from the orthophotographs, 1/95

N

50   0   50 Feet

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared
by: Professional Environmental Group, L.L.C.

For: Kaiser-Hill   RFETS GIS Dept.
            Company, LLC   303-966-7707

MAP ID: 04-0035   September 8, 2004

Projects

C-1 Pond Project

Monitoring Well Installation

North Access Road and Culvert Removal

Original Landfill Project

Pond Remediation A-Series

Pond Remediation B-Series

Old Process Waste Line Removal Project

Surface Water Equipment Removal

Waste Water Treatment Plant

C-1 Pond

(clicking on any photopoint on the map will take you to the corresponding monitoring photos)
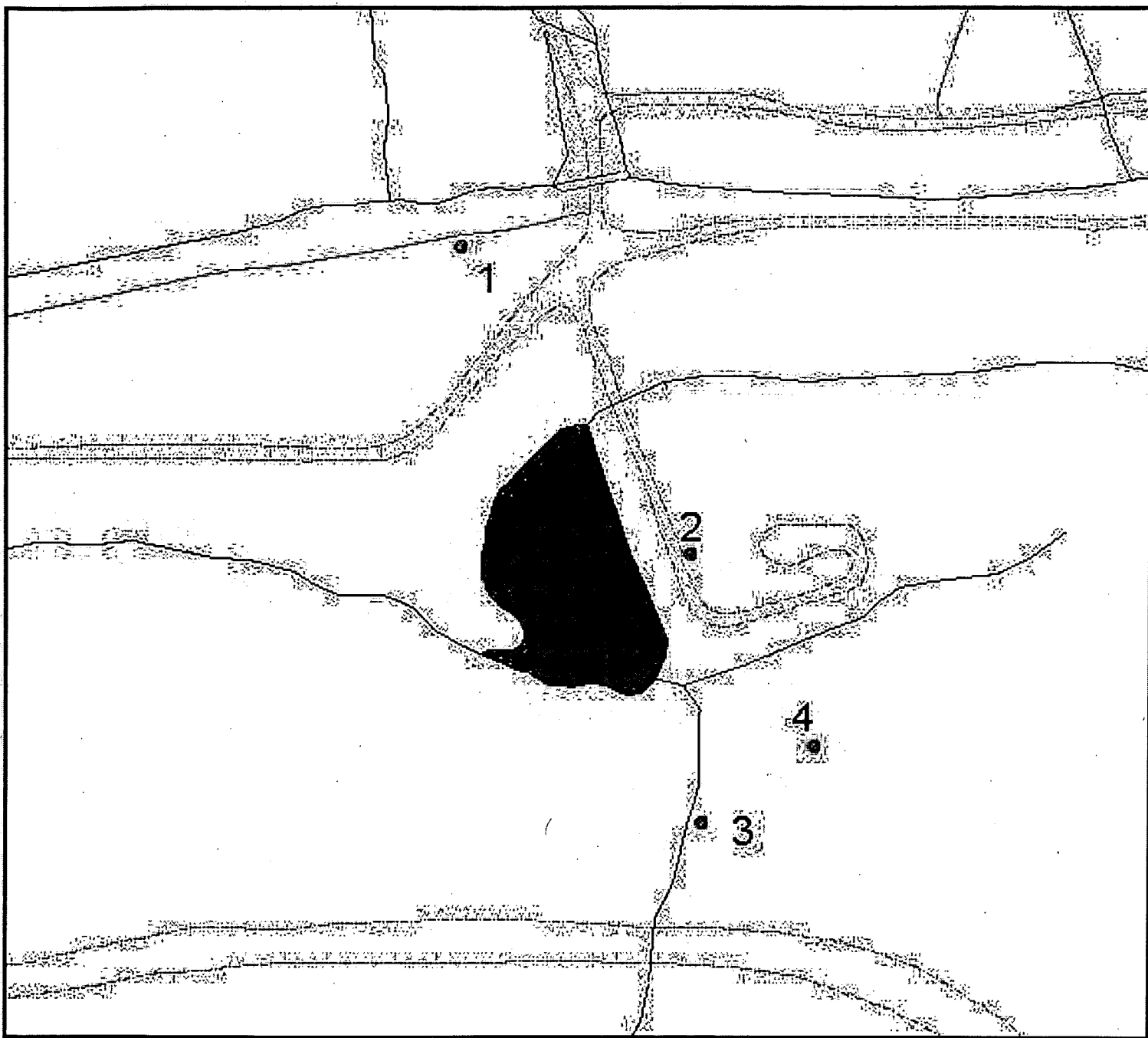
C-1 Pond

Photopoint 1

6/23/2004
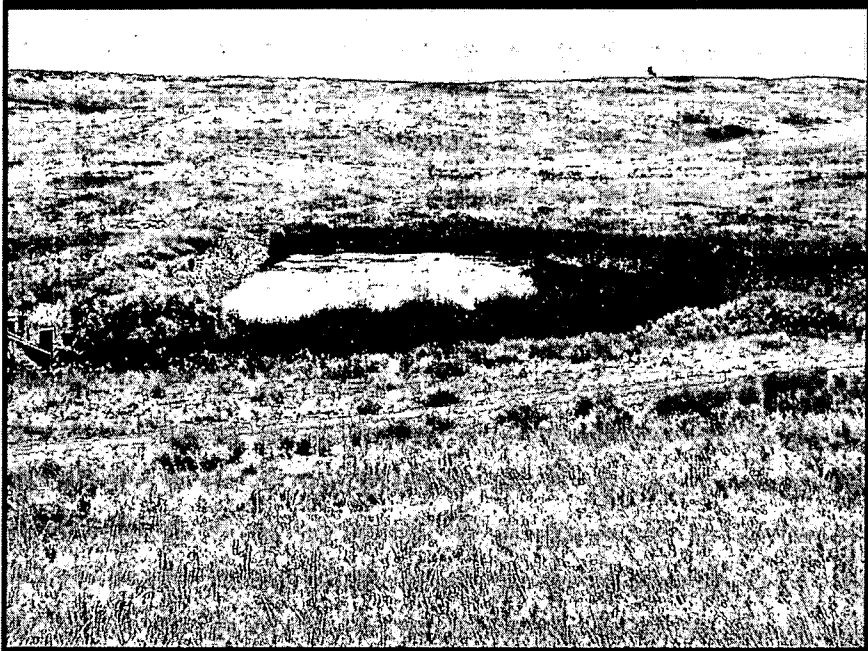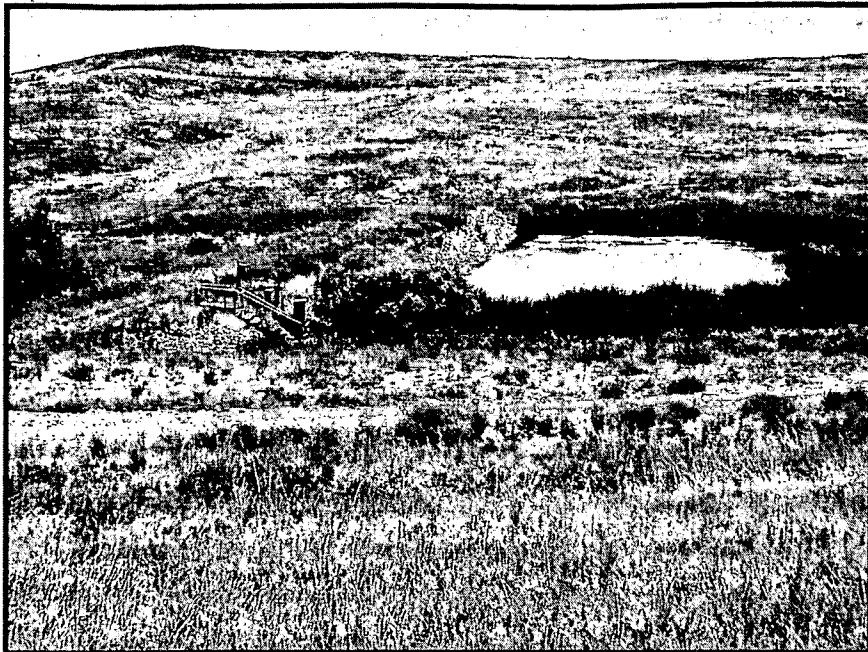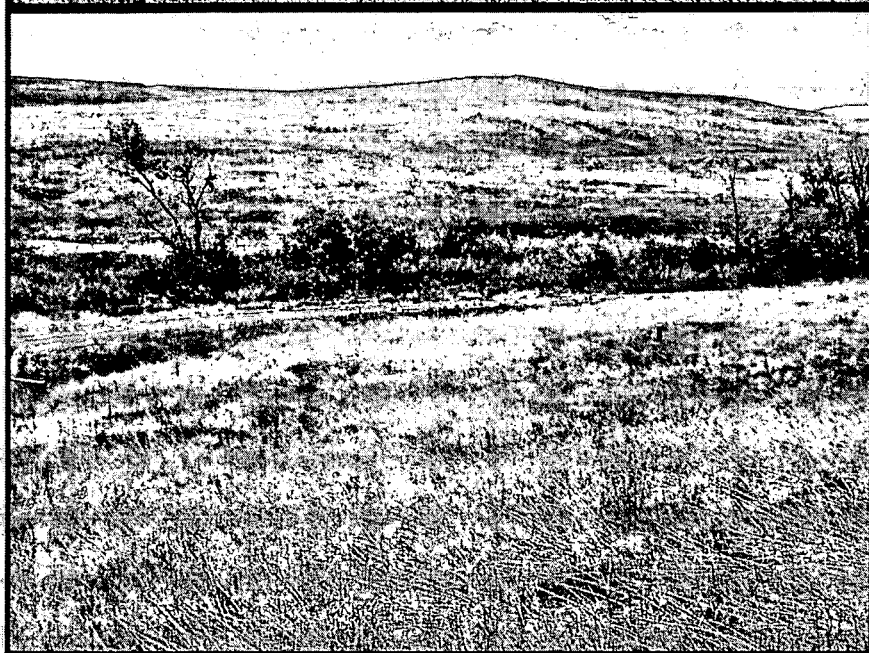
C-1 Pond

Photopoint 2

6/23/2004
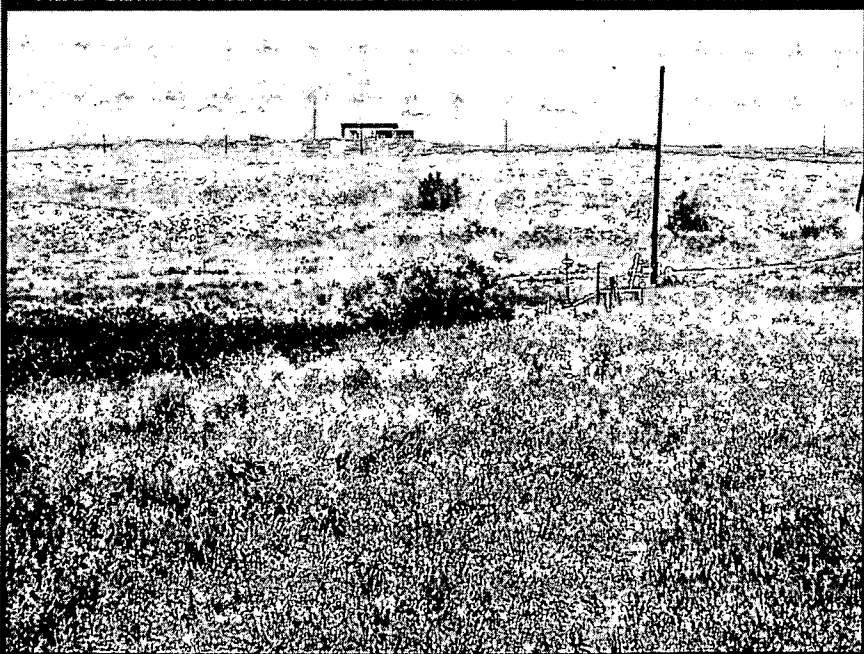
C-1 Pond

Photopoint 3

6/23/2004
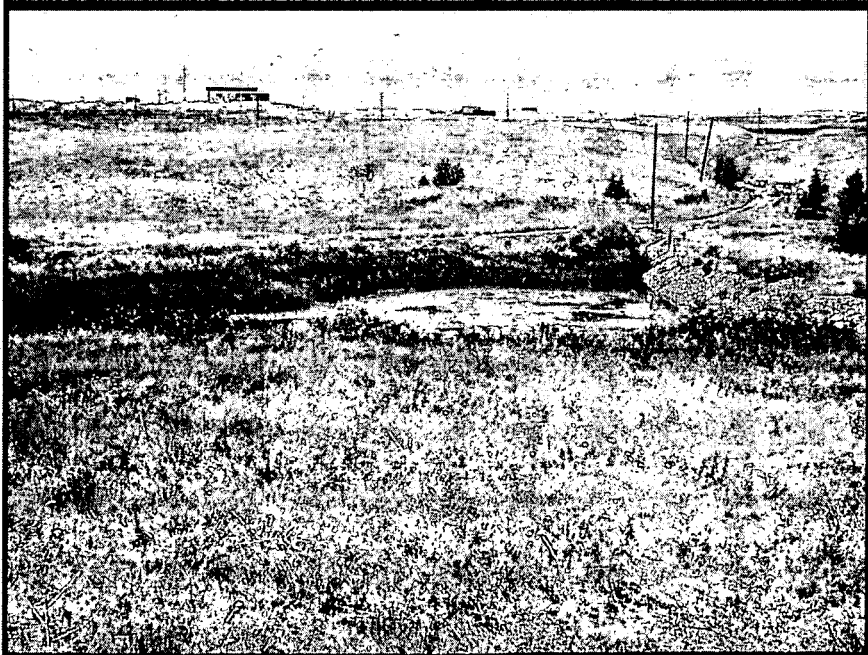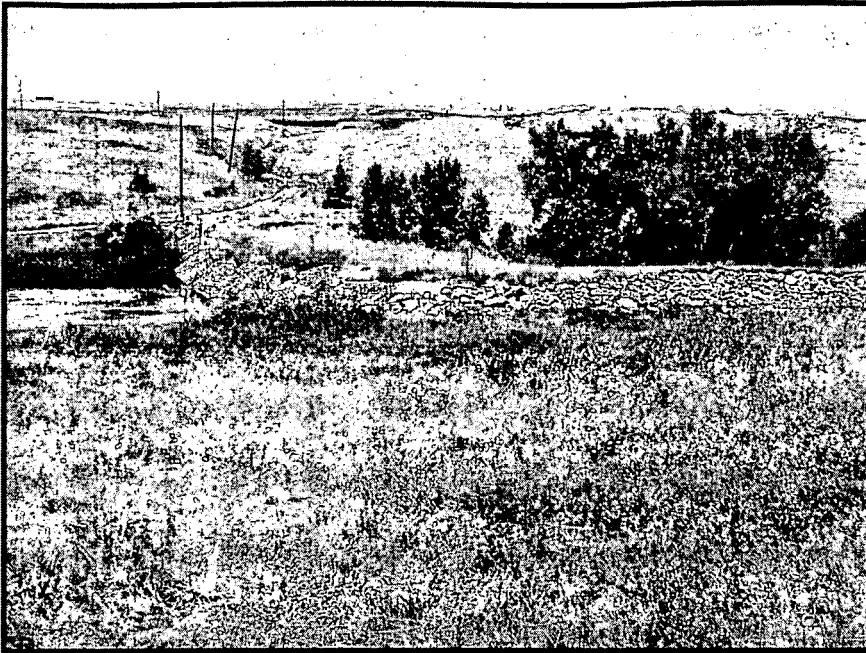
C-1 Pond

Photopoint 4

6/23/2004
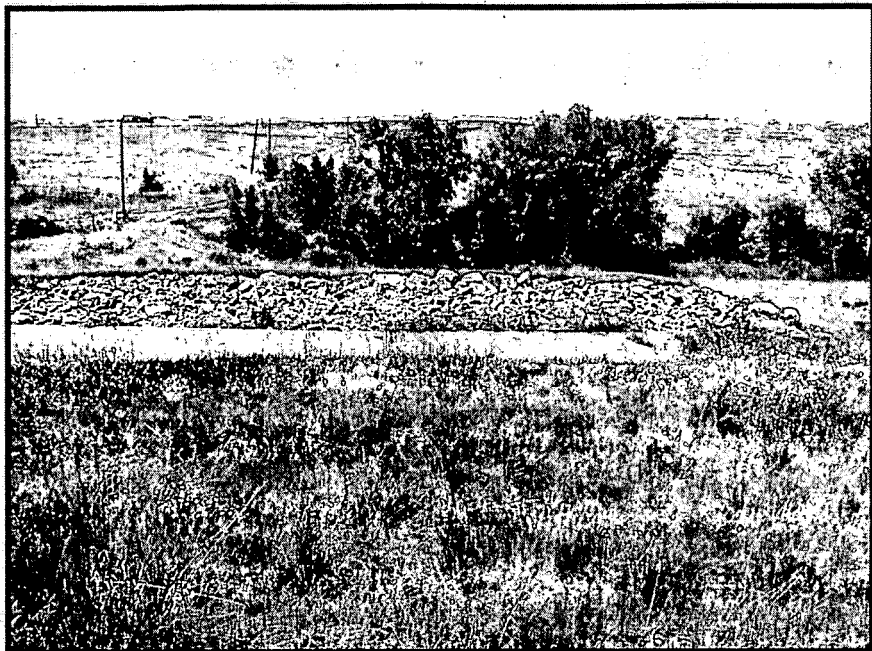
Monitoring Well Installation

(clicking on any photopoint on the map will take you to the corresponding monitoring photos)
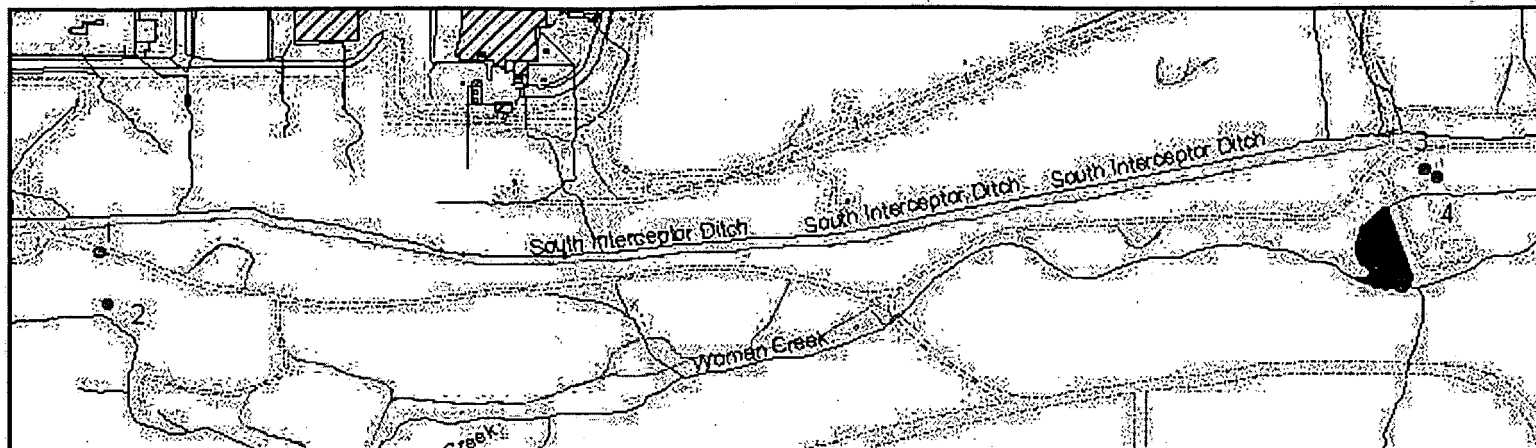
Photopoint 1

Photopoint 2

Photopoint 3

Photopoint 4

North Access Road and Culvert Removal Project

(clicking on any photopoint on the map will take you to the corresponding monitoring photos)
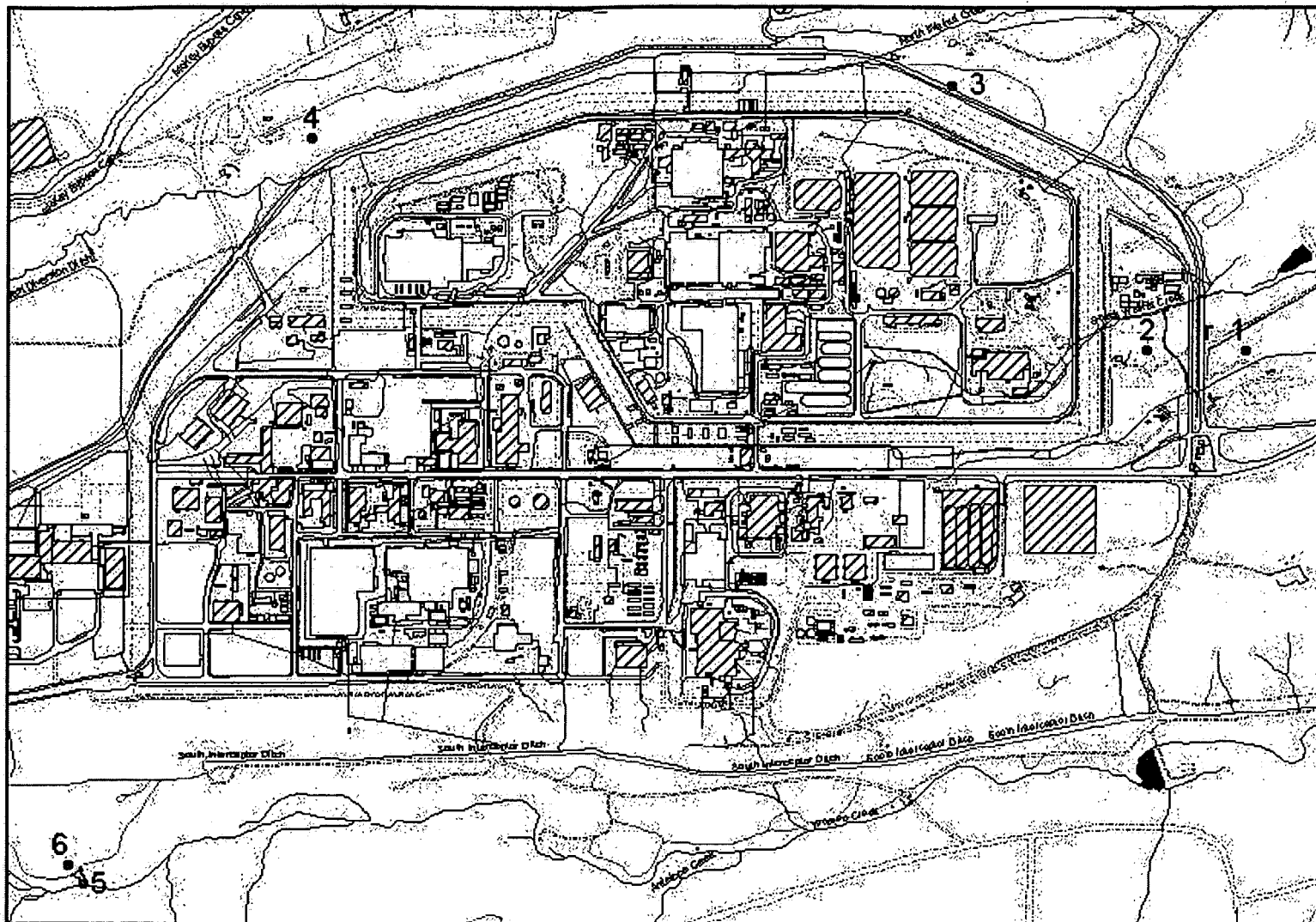
Photopoint 1

07/27/04
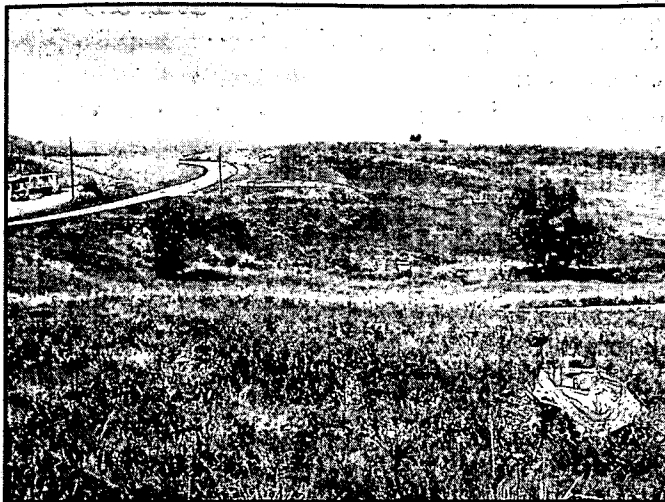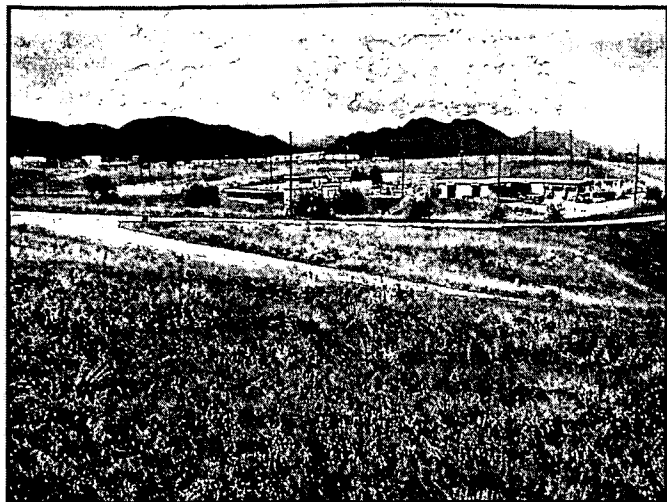
Photopoint 2

07/27/04
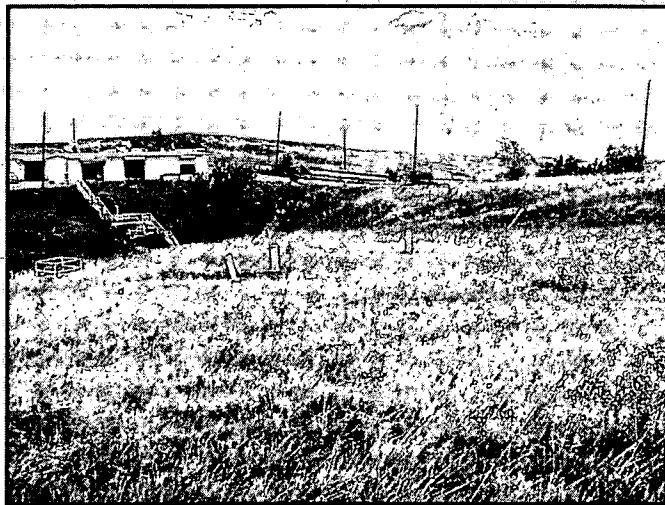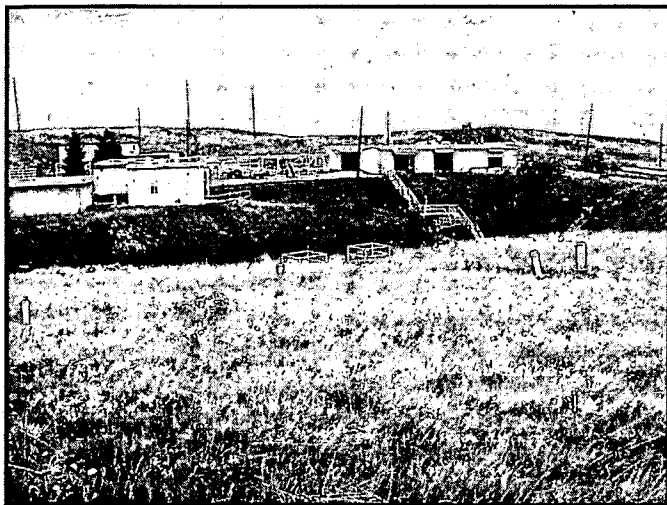
Photopoint 3

07/27/04
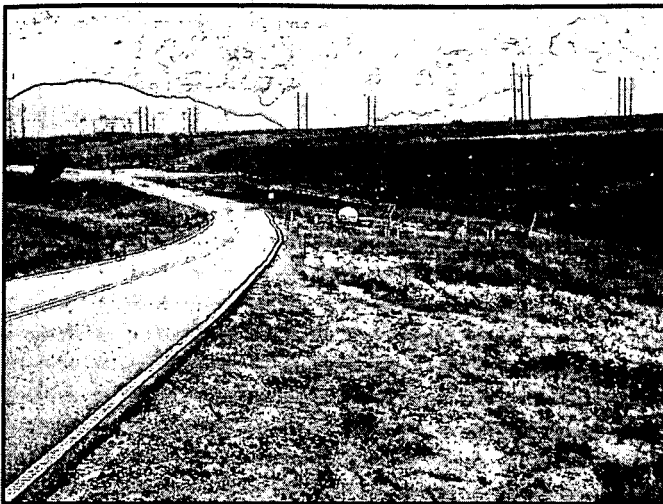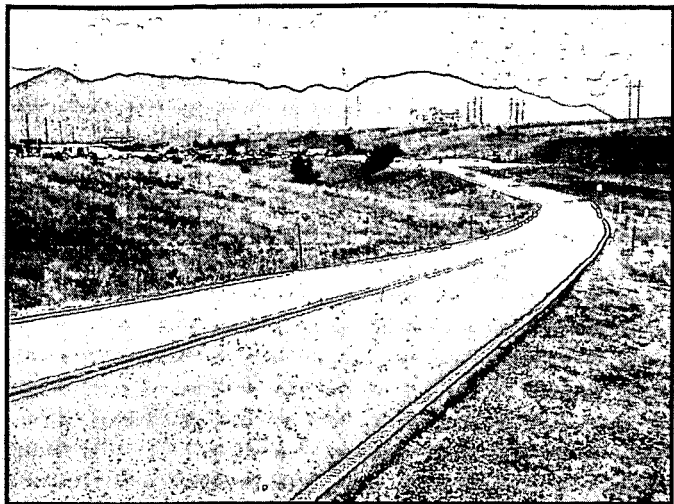
Photopoint 4

07/27/04
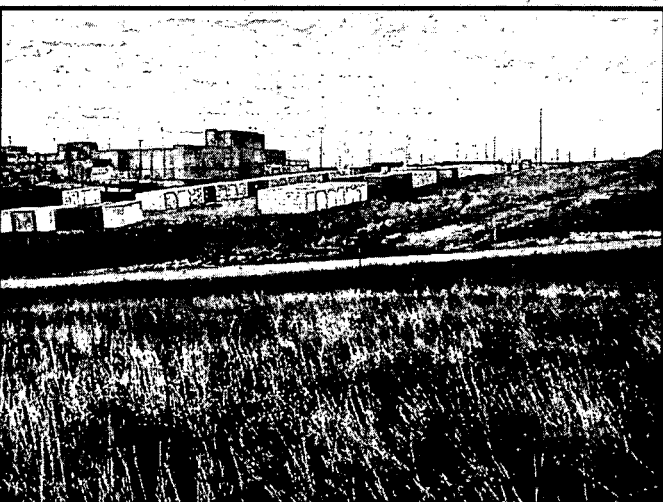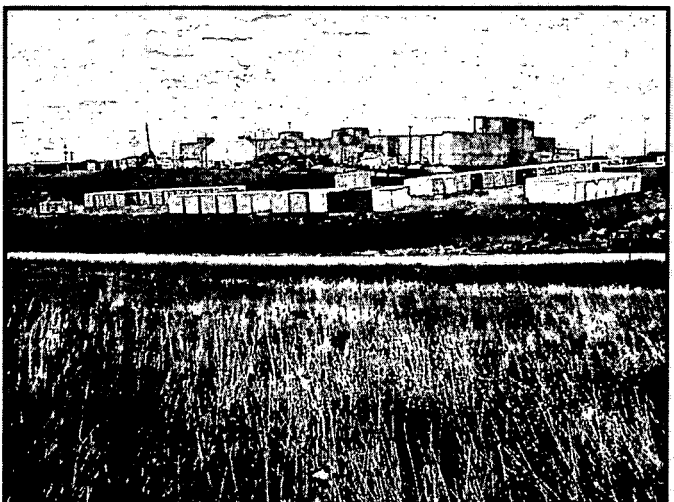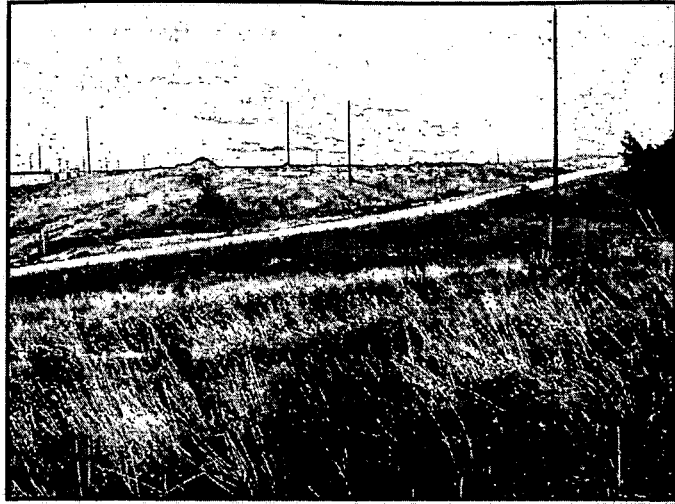
Photopoint 5

07/27/04   09/01/04

09/01/04

Photopoint 6

09/01/04

Original Landfill Project

(clicking on any photopoint on the map will take you to the corresponding monitoring photos)
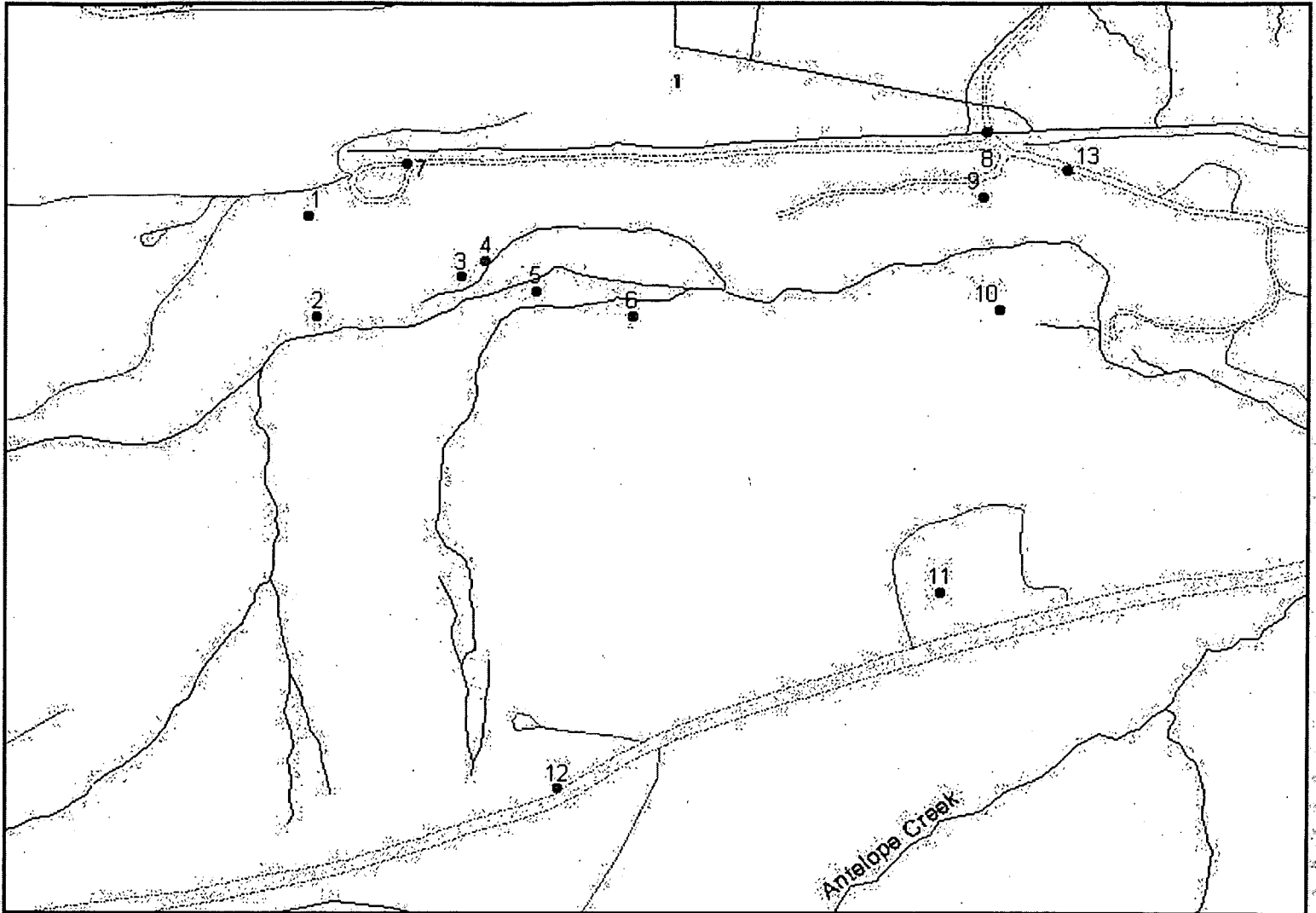
Original Landfill

Photopoint 1

2004

Original Landfill

Photopoint 2

2004

Original Landfill

Photopoint 3

2004

Original Landfill

Photopoint 4

2004

Original Landfill

Photopoint 5

2004

Original Landfill

Photopoint 6

2004

Original Landfill

Photopoint 7

2004

Original Landfill

Photopoint 8

2004
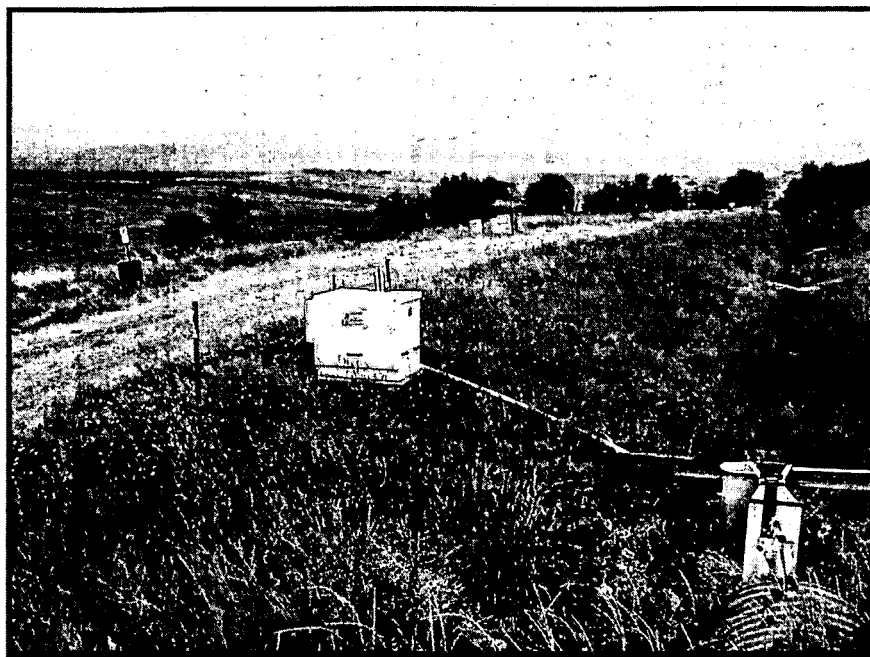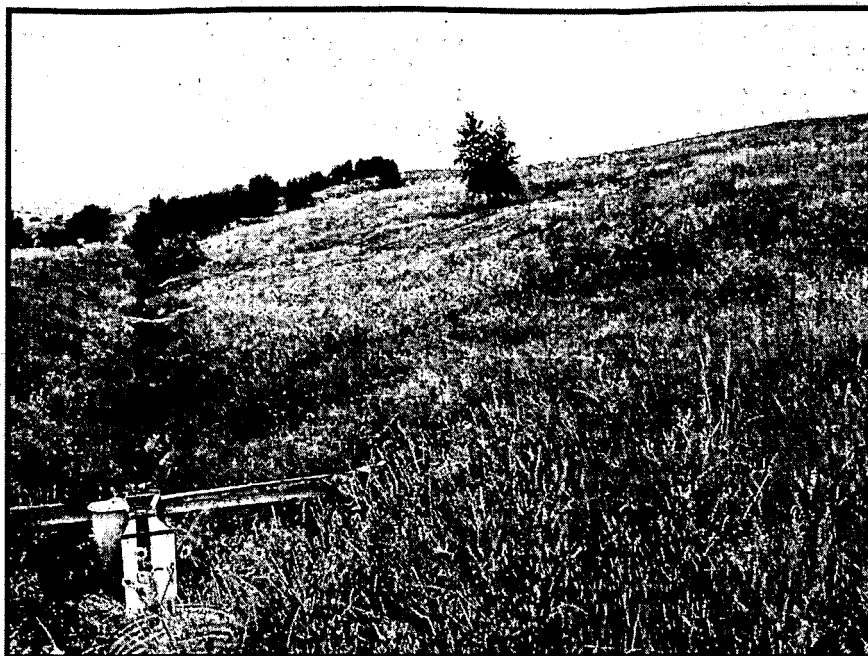
Original Landfill

Photopoint 9

2004

OLF photos
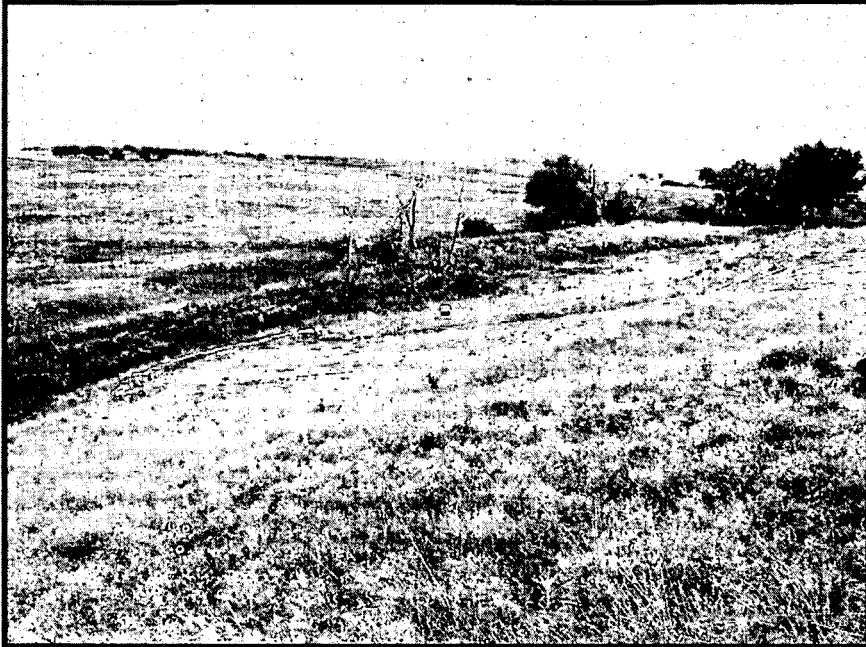
Original Landfill

Photopoint 10

2004

OLF photos

Original Landfill

Photopoint 11

2004

OLF photos

OLF photos

OLF photos
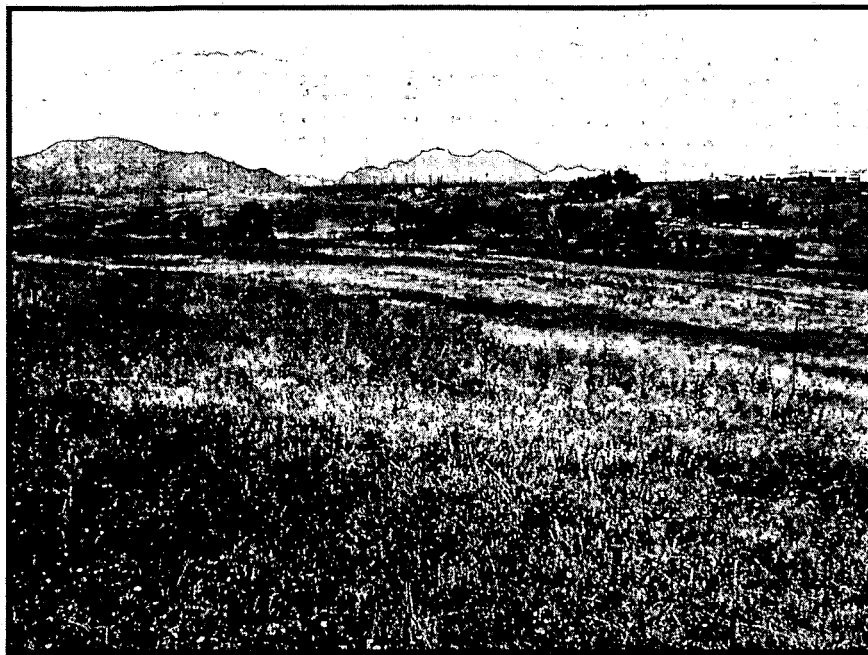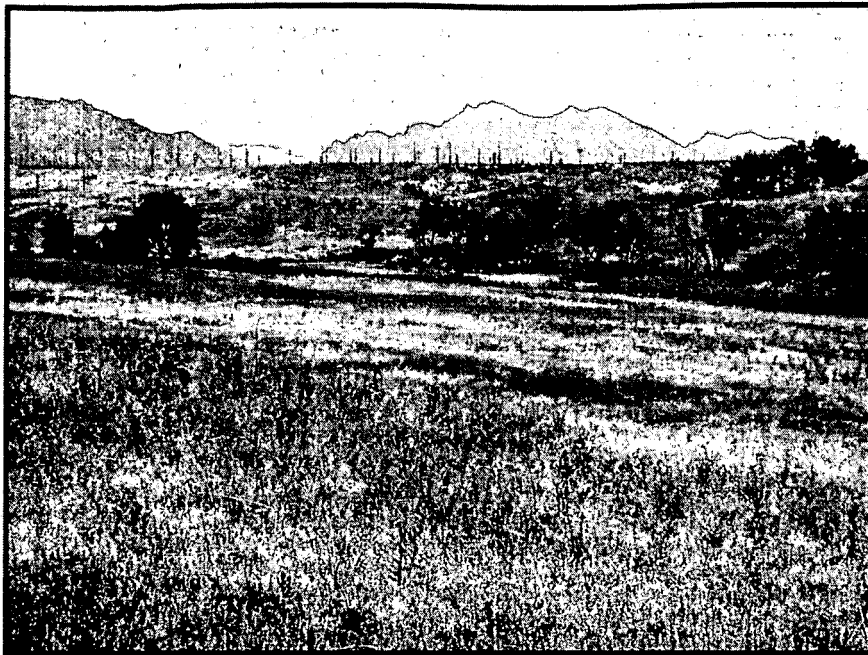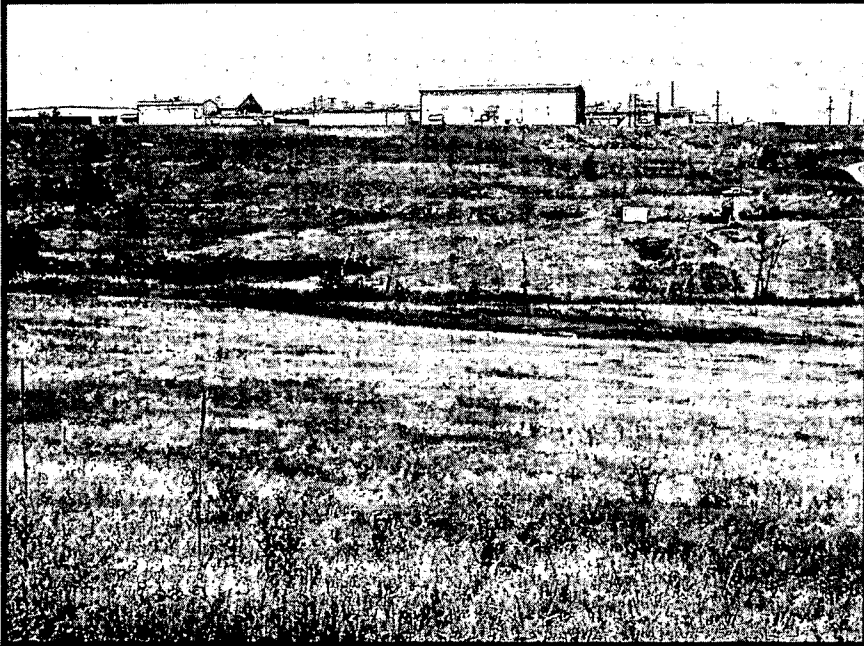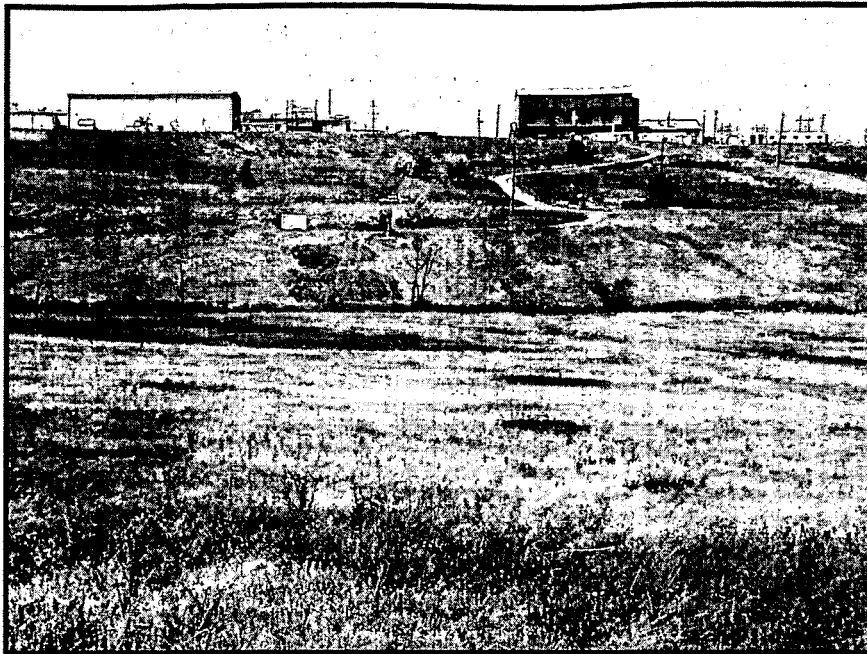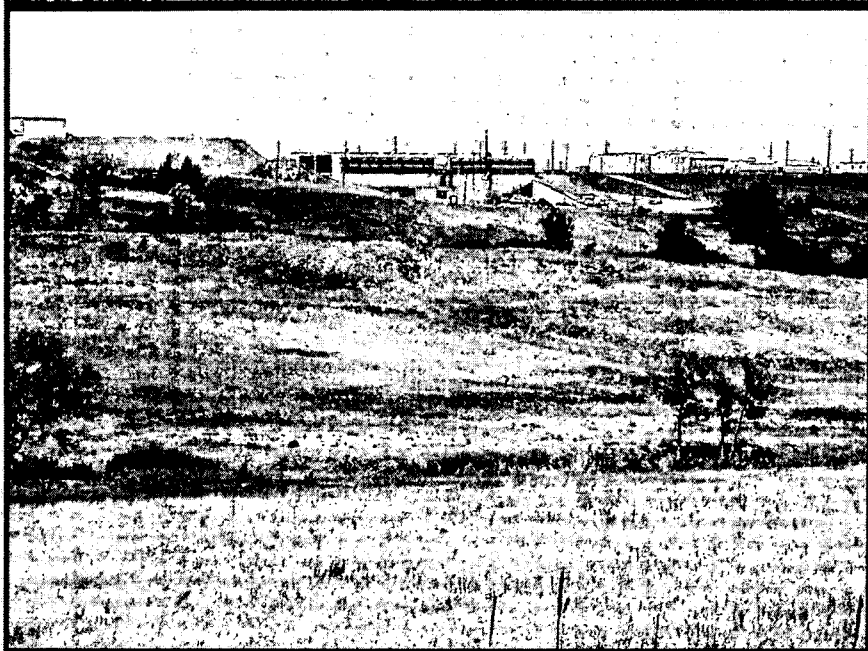
Original Landfill

Photopoint 12

2004

OLF photos

OLF photos

Original Landfill

Photopoint 13

2004

Pond Remediation

A-Series

(clicking on any photopoint on the map will take you to the corresponding monitoring photos)
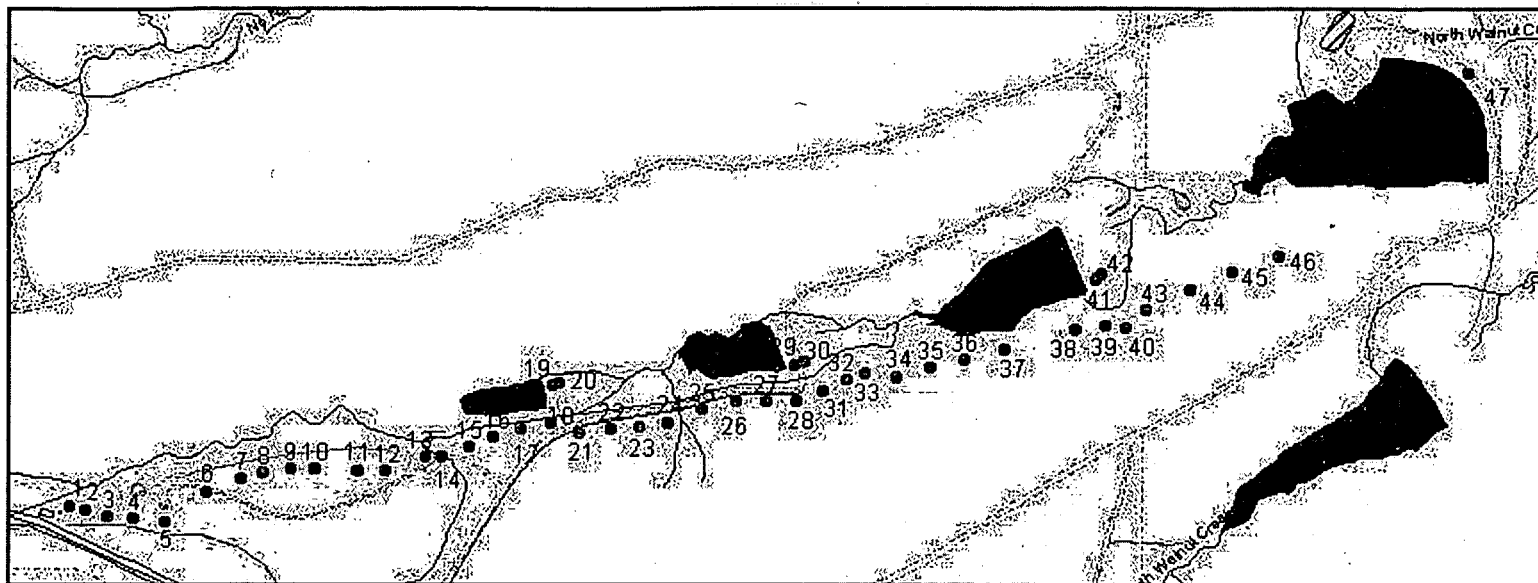
Pond Remediation

A-Series, Photopoints 1-10

6/29/2004

Photopoint 1
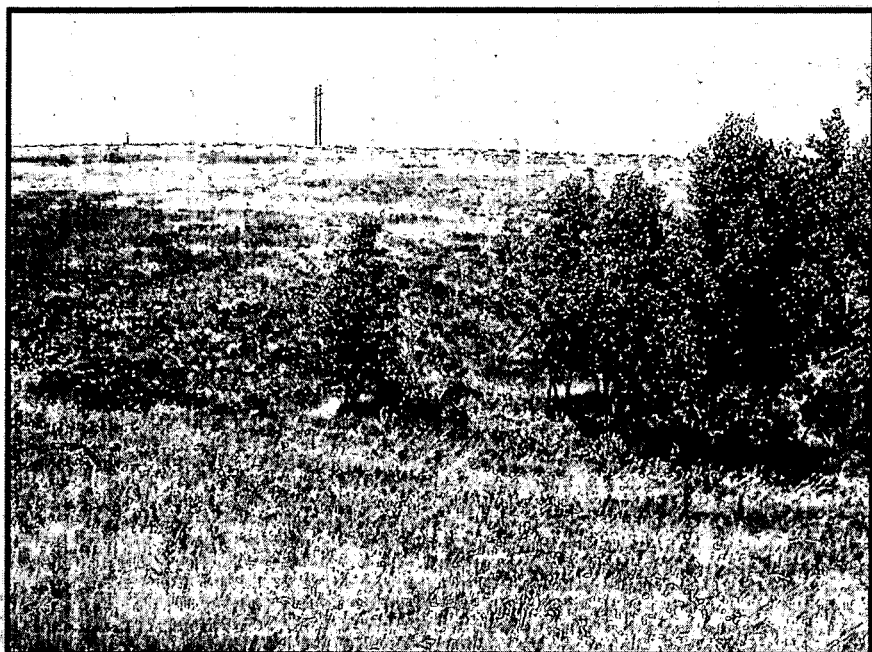
Photopoint 2

Photopoint 3
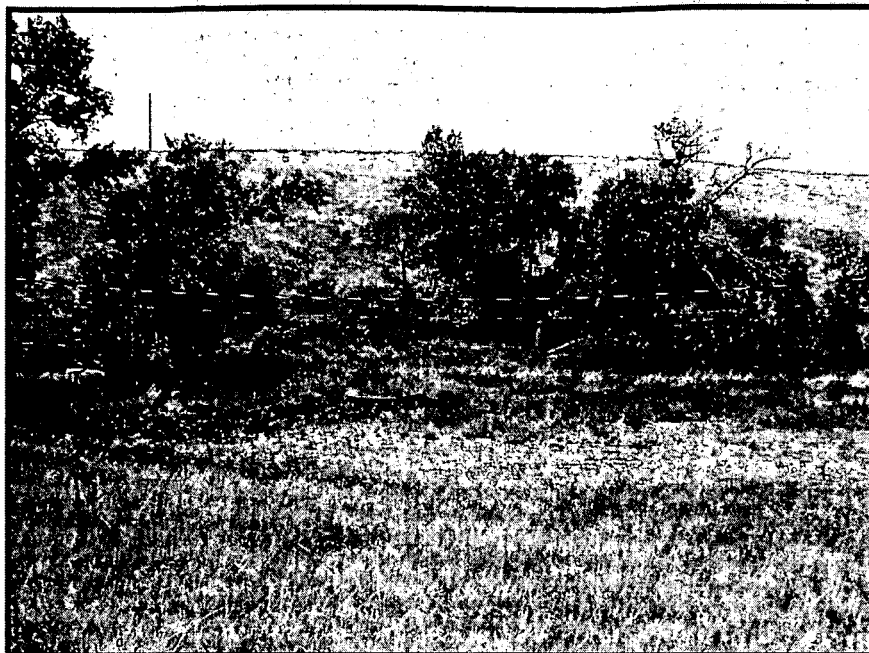
Photopoint 4

Photopoint 5

Photopoint 6

Photopoint 7

Photopoint 8
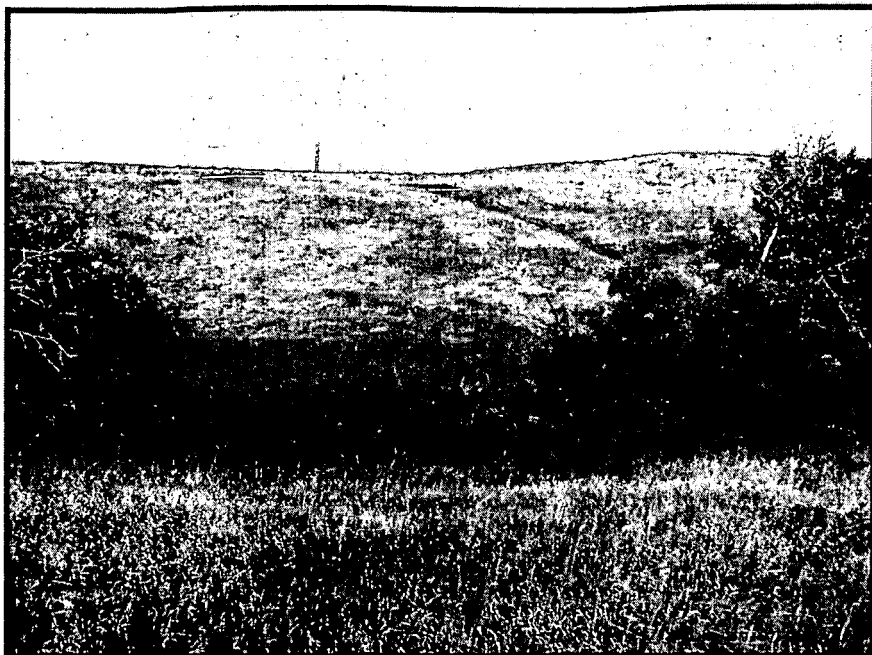
Photopoint 9

Photopoint 10

Pond Remediation

A-Series, Photopoints 11-18

6/29/2004

Photopoint 11
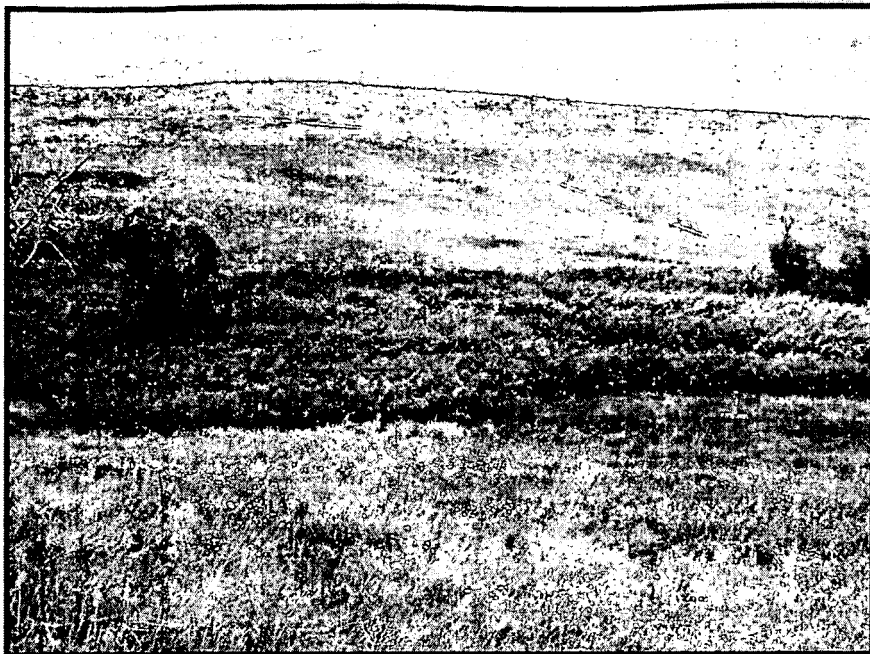
Photopoint 12

Photopoint 13
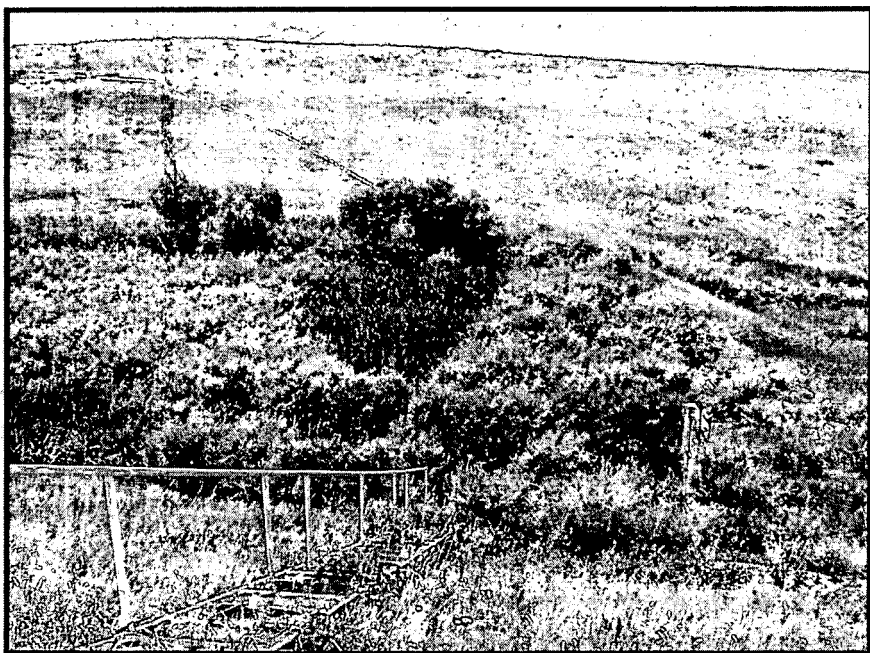
Photopoint 14
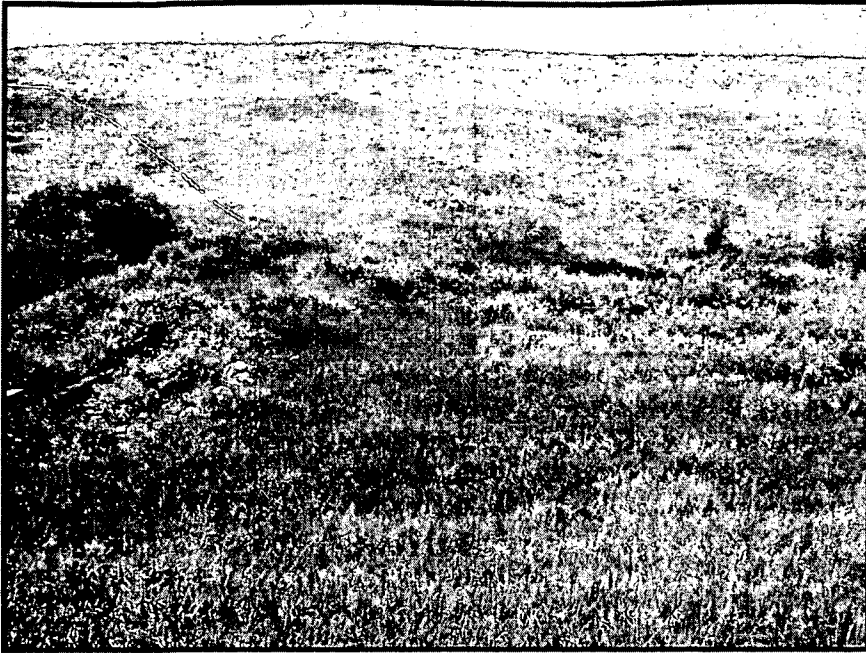
Photopoint 15
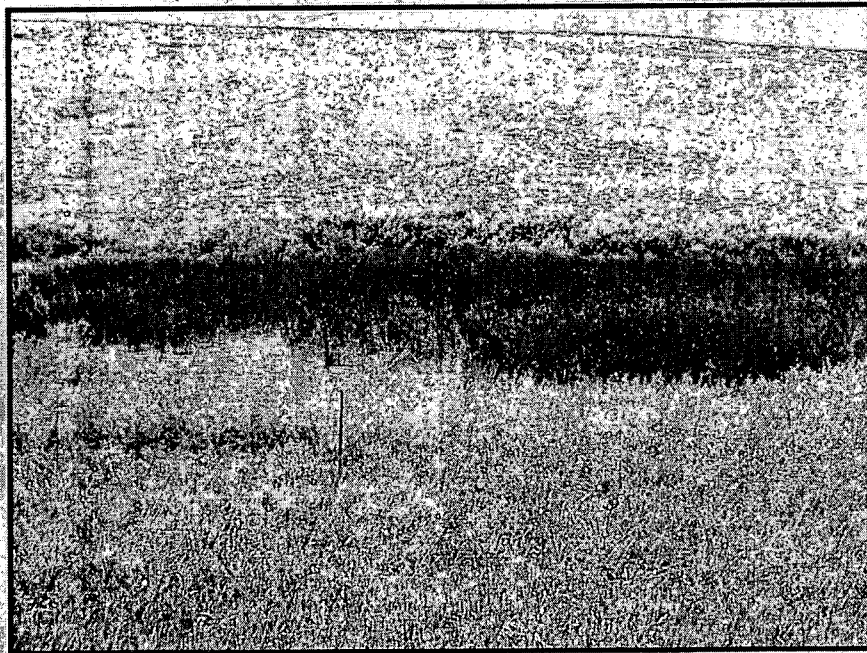
Photopoint 16
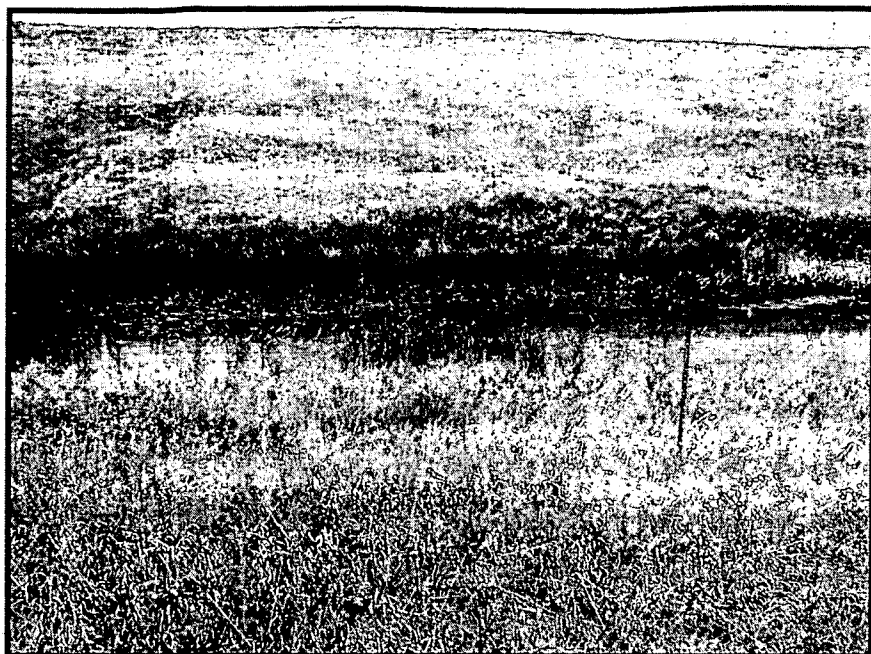
Photopoint 17
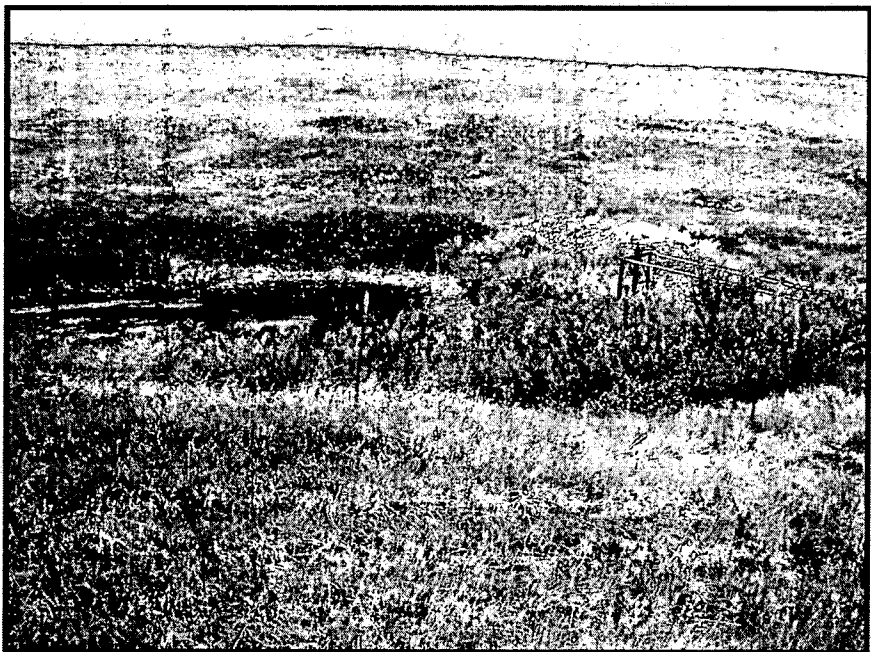
Photopoint 18

Pond Remediation

A-Series, Photopoints 19-28

6/29/2004

Photopoint 19 (Pond A-1)
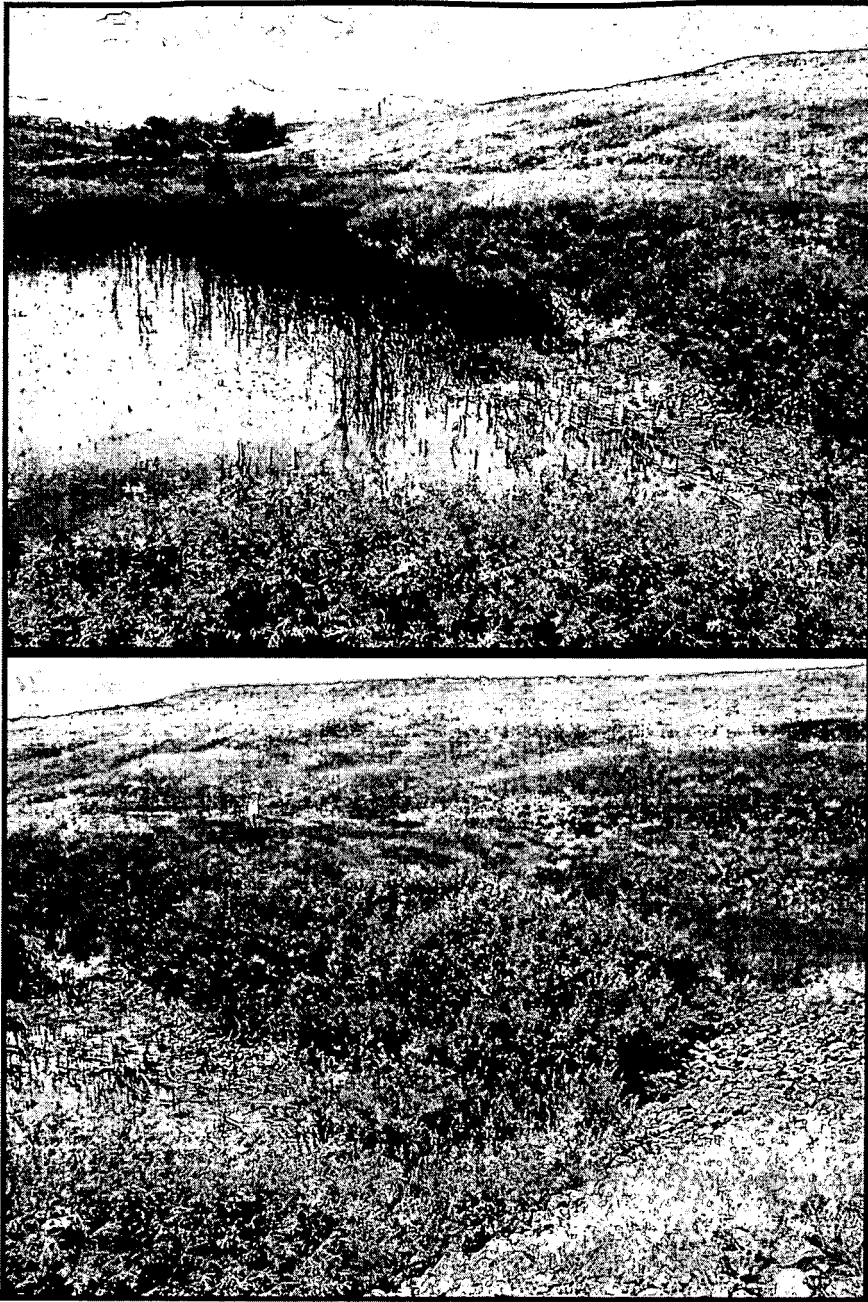
Photopoint 20 (A-2 Pond)
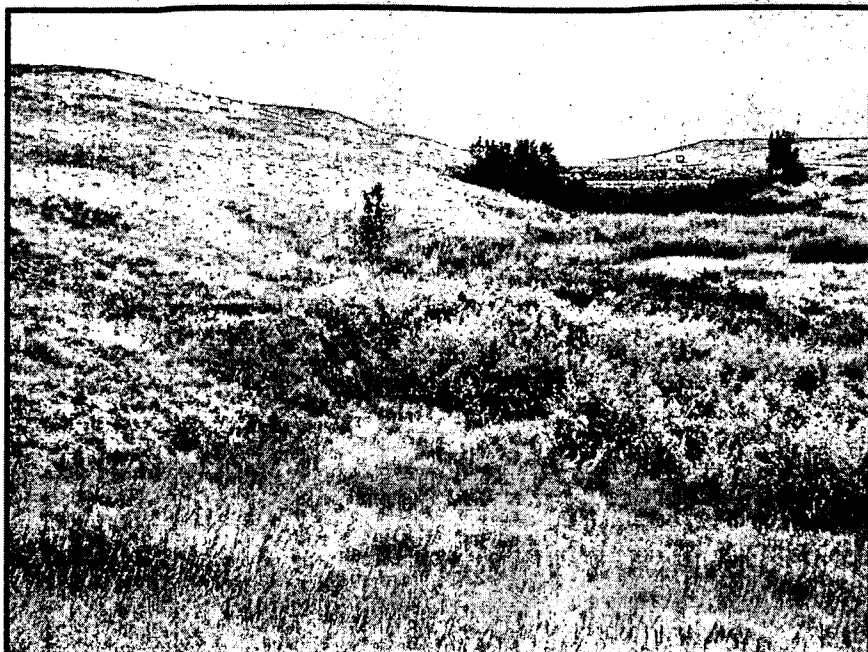
Photopoint 21
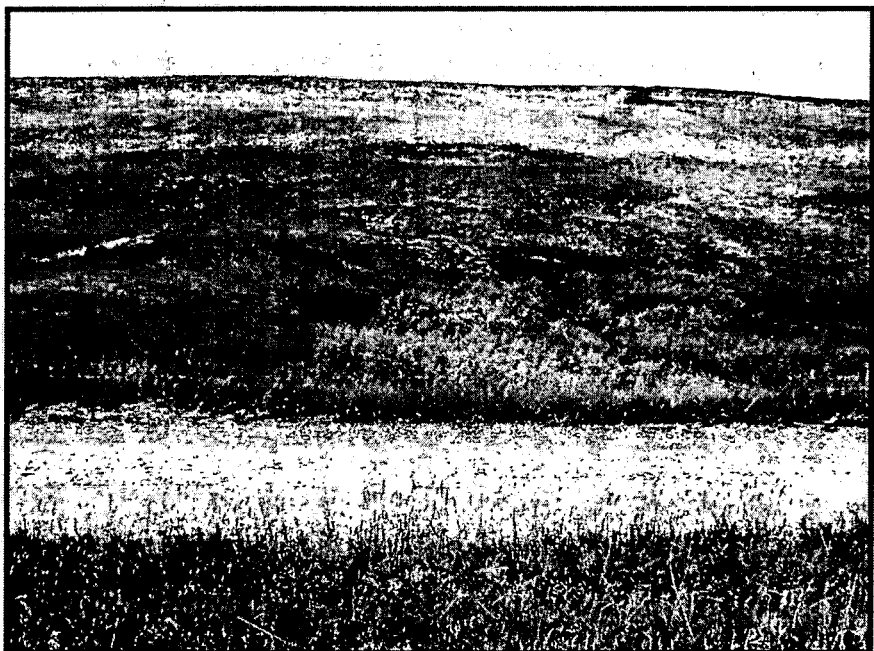
Photopoint 22
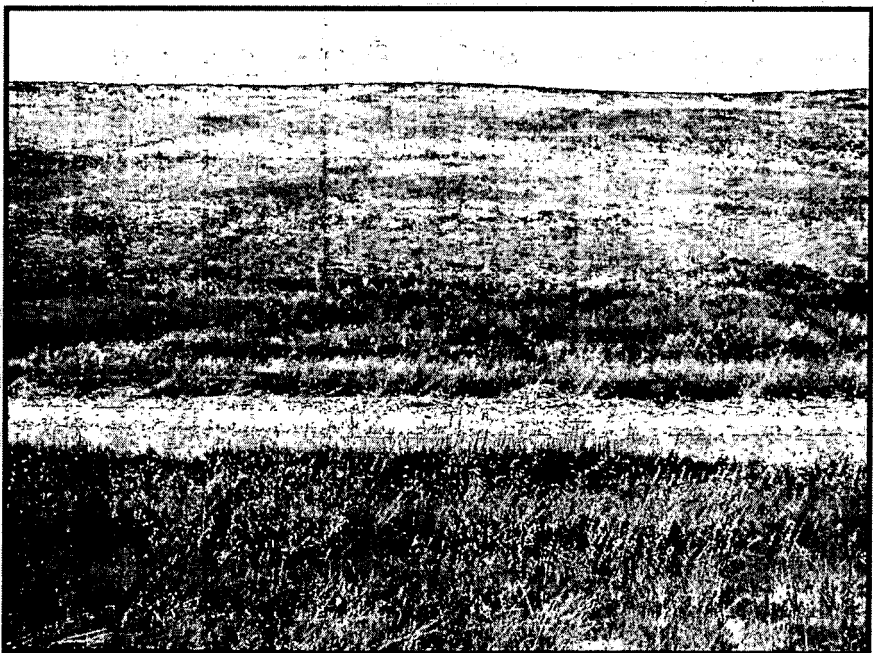
Photopoint 23

Photopoint 24

Photopoint 25

Photopoint 26

Photopoint 27

Photopoint 28

Pond Remediation

A-Series, Photopoints 29-37

6/29/2004

Photopoint 29 (A-2 Pond)
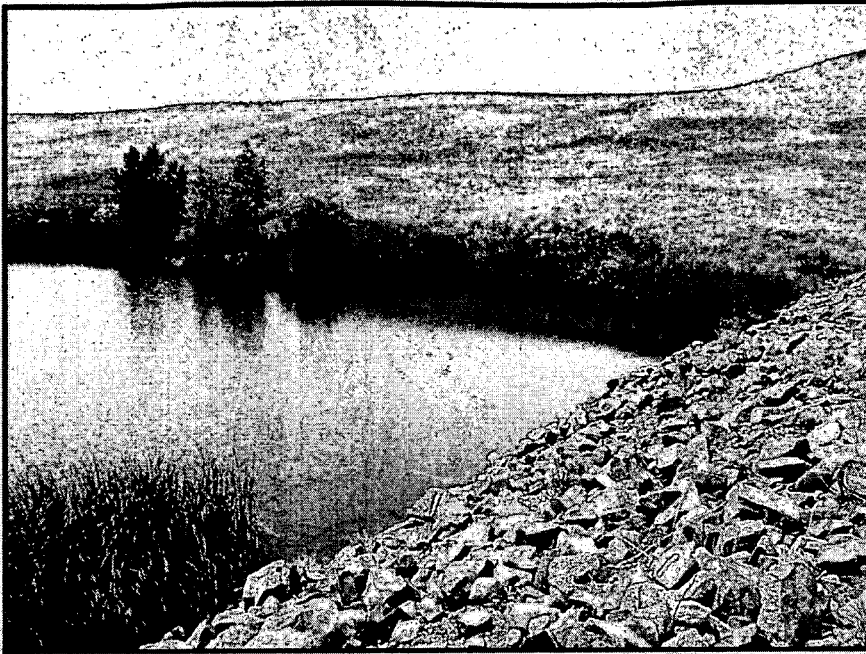
Photopoint 30 (A-3 Pond)
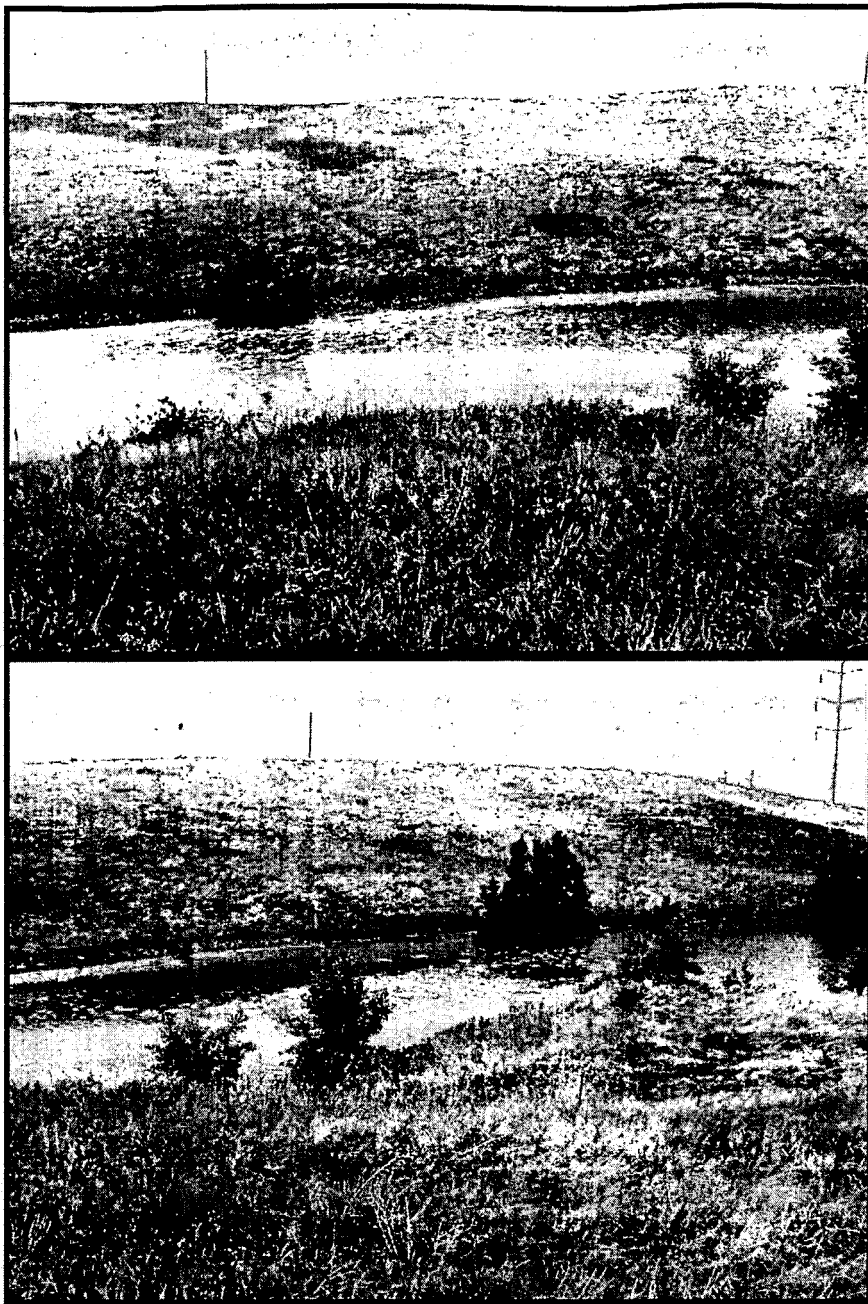
Photopoint 31
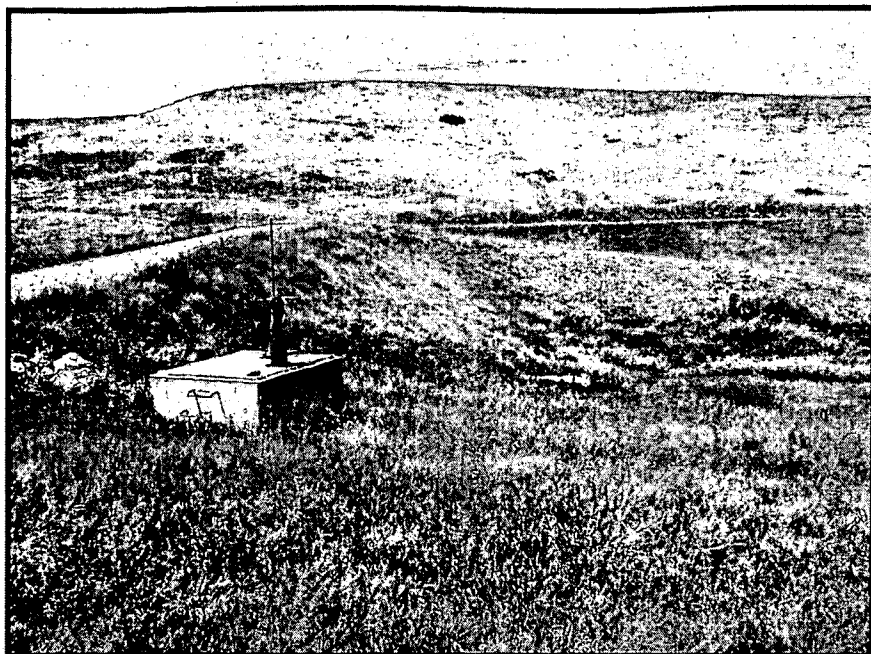
Photopoint 32
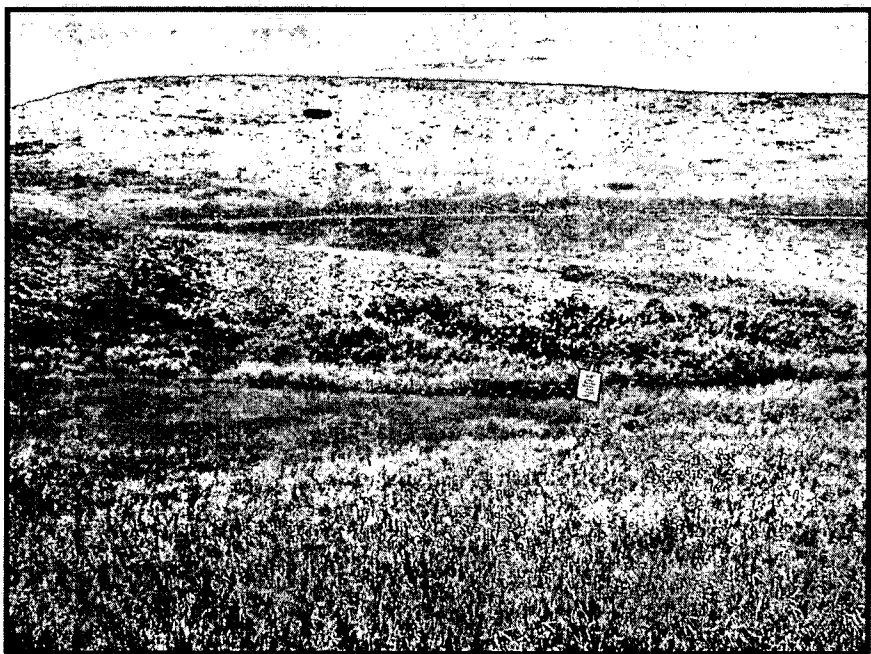
Photopoint 33
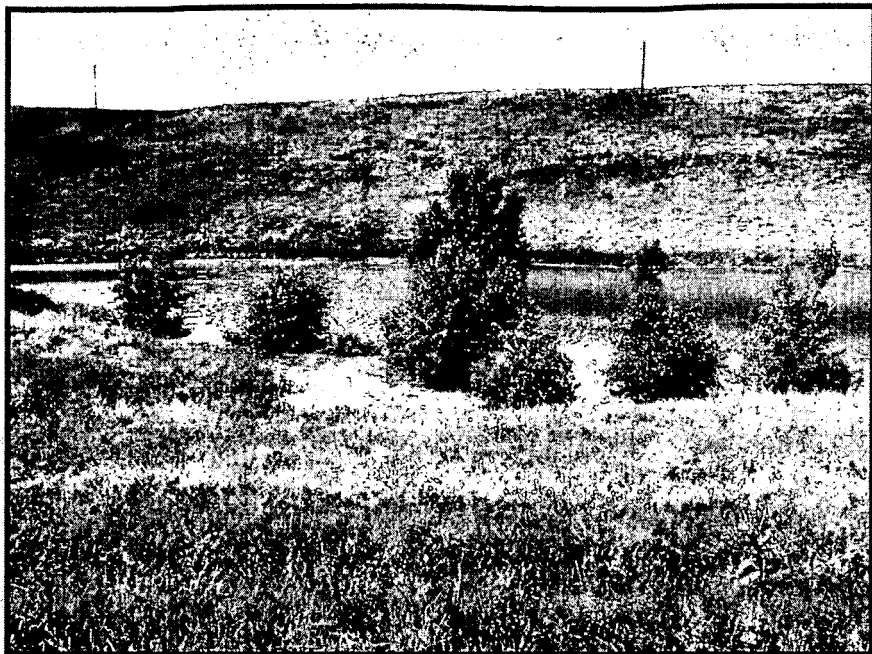
Photopoint 34
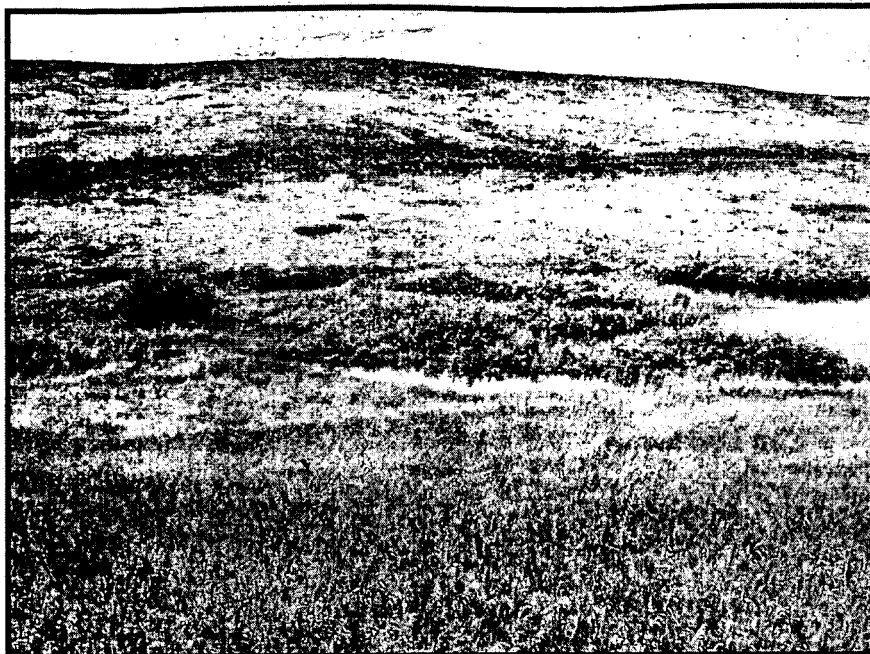
Photopoint 35

Photopoint 36

Photopoint 37 (A-3 Pond)
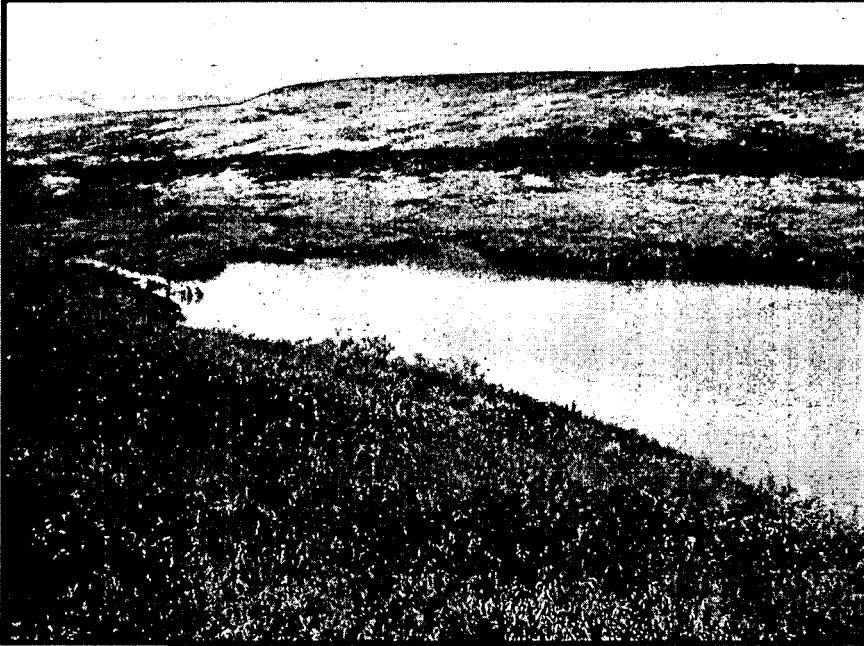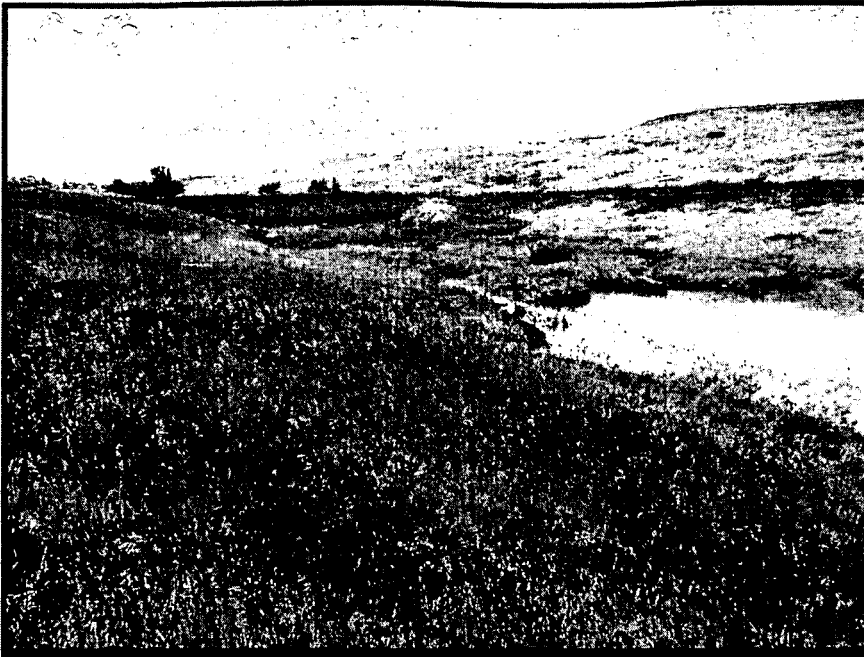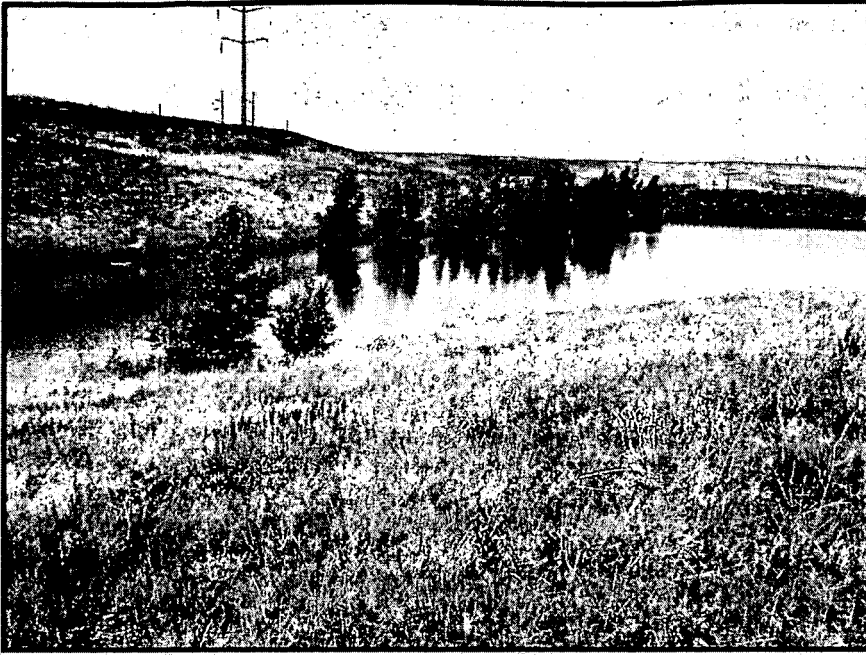
Pond Remediation

A-Series, Photopoints 38-43

6/29/2004

Photopoint 38

Photopoint 39

Photopoint 40
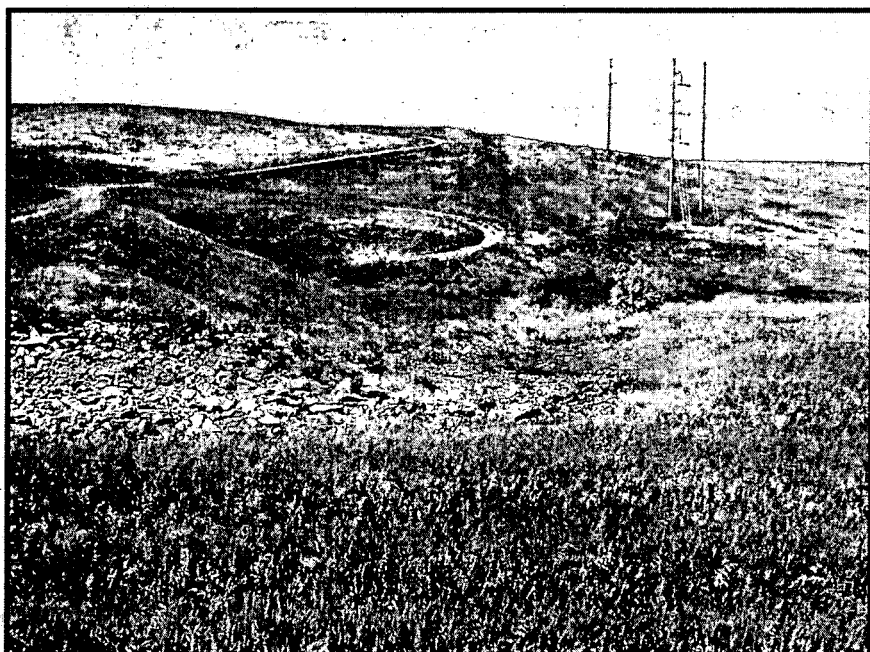
Photopoint 41 (A-3 Pond)
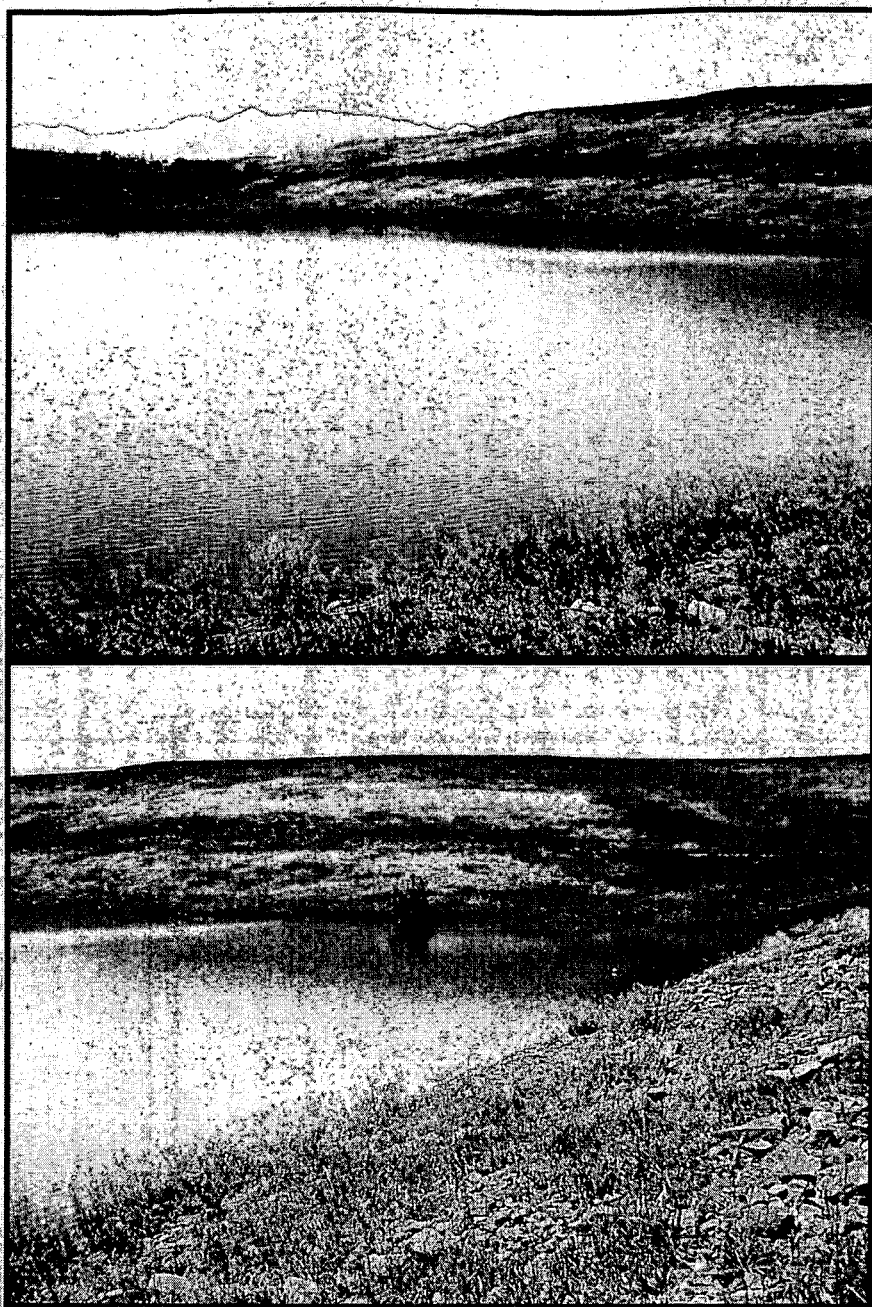
Photopoint 42 (A-4 Pond)
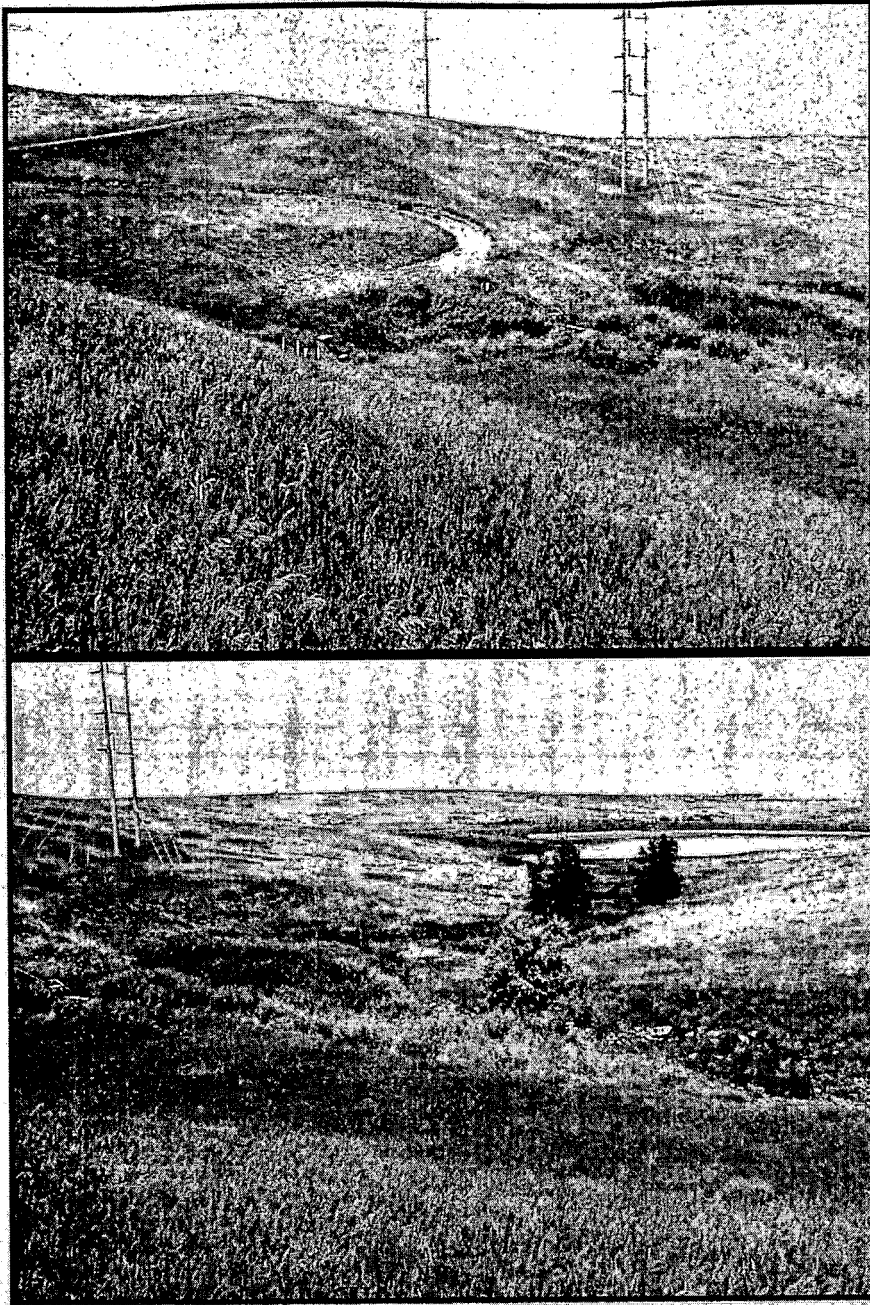
Photopoint 43
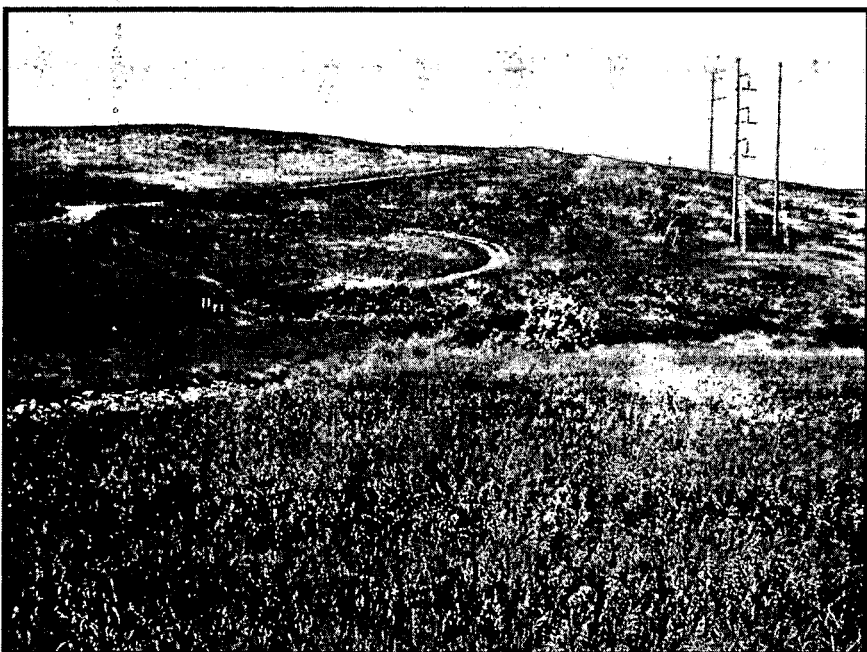
Pond Remediation

A-Series, Photopoints 44-47

6/29/2004

Photopoint 44
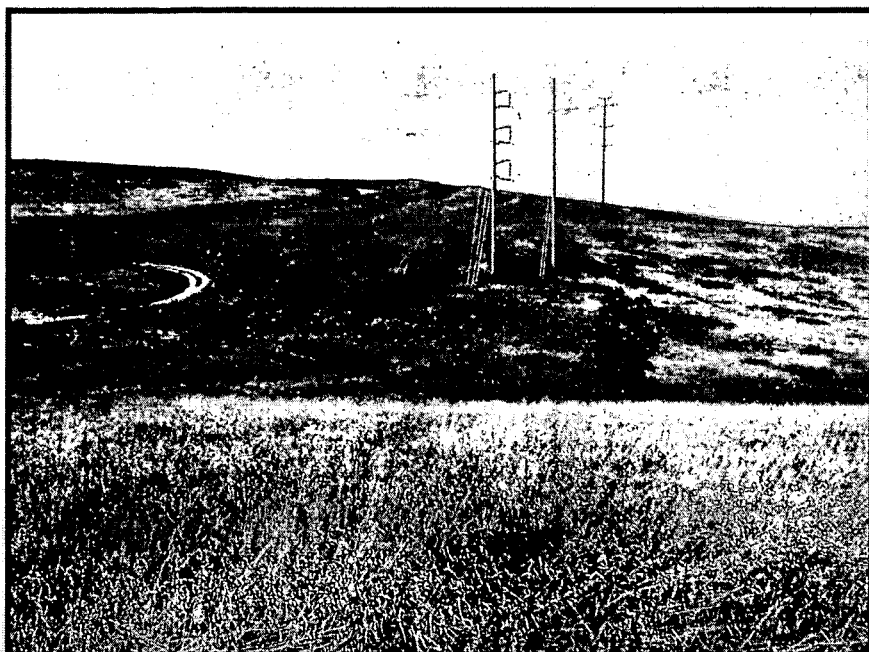
Photopoint 45
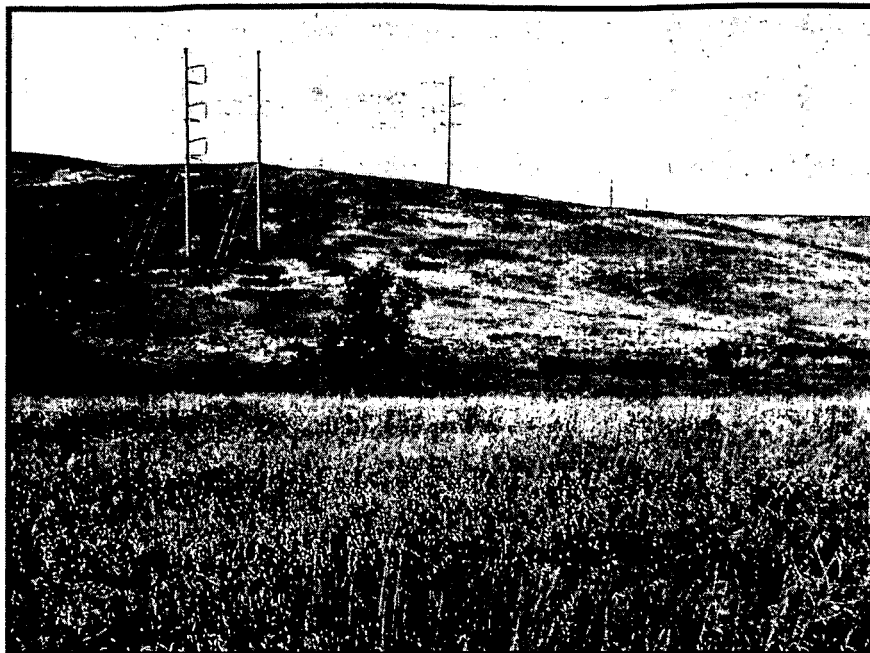
Photopoint 46 (A-4 Pond)

Photopoint 47 (A-4 Pond)
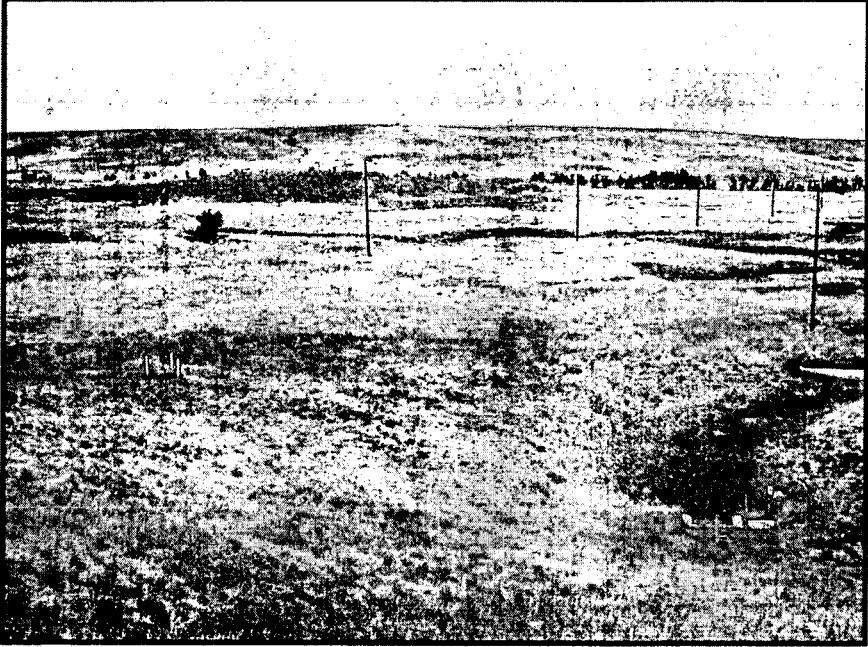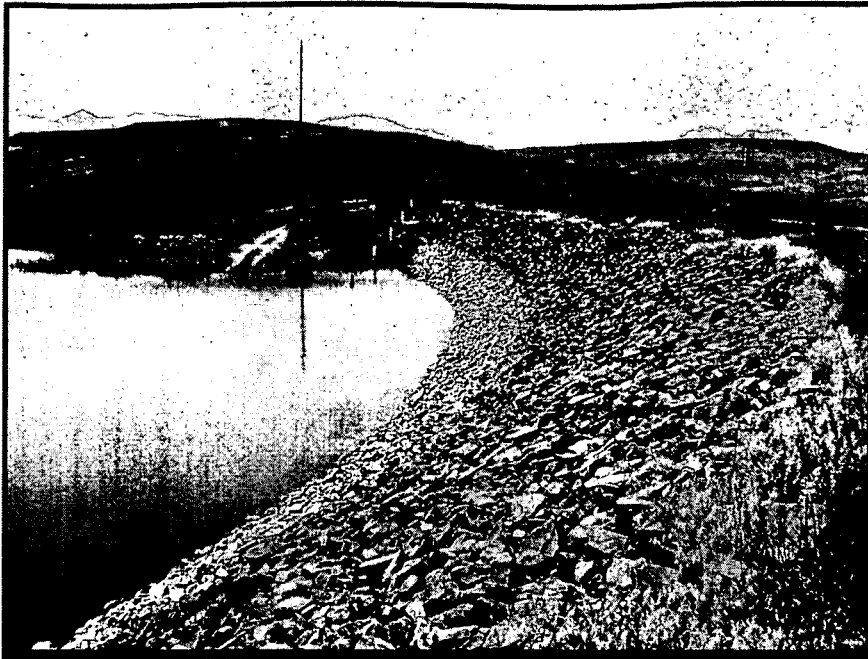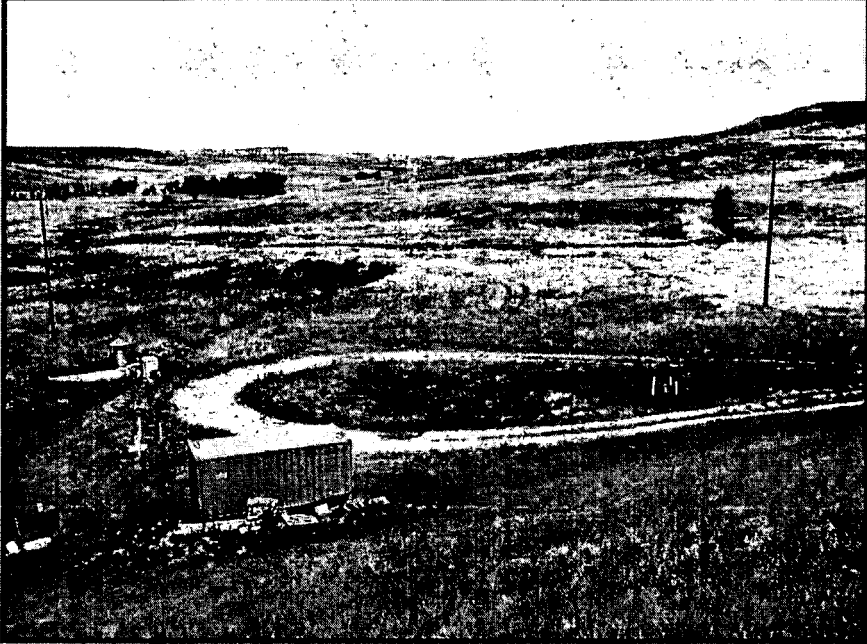
Pond Remediation

B-Series

(clicking on any photopoint on the map will take you to the corresponding monitoring photos)
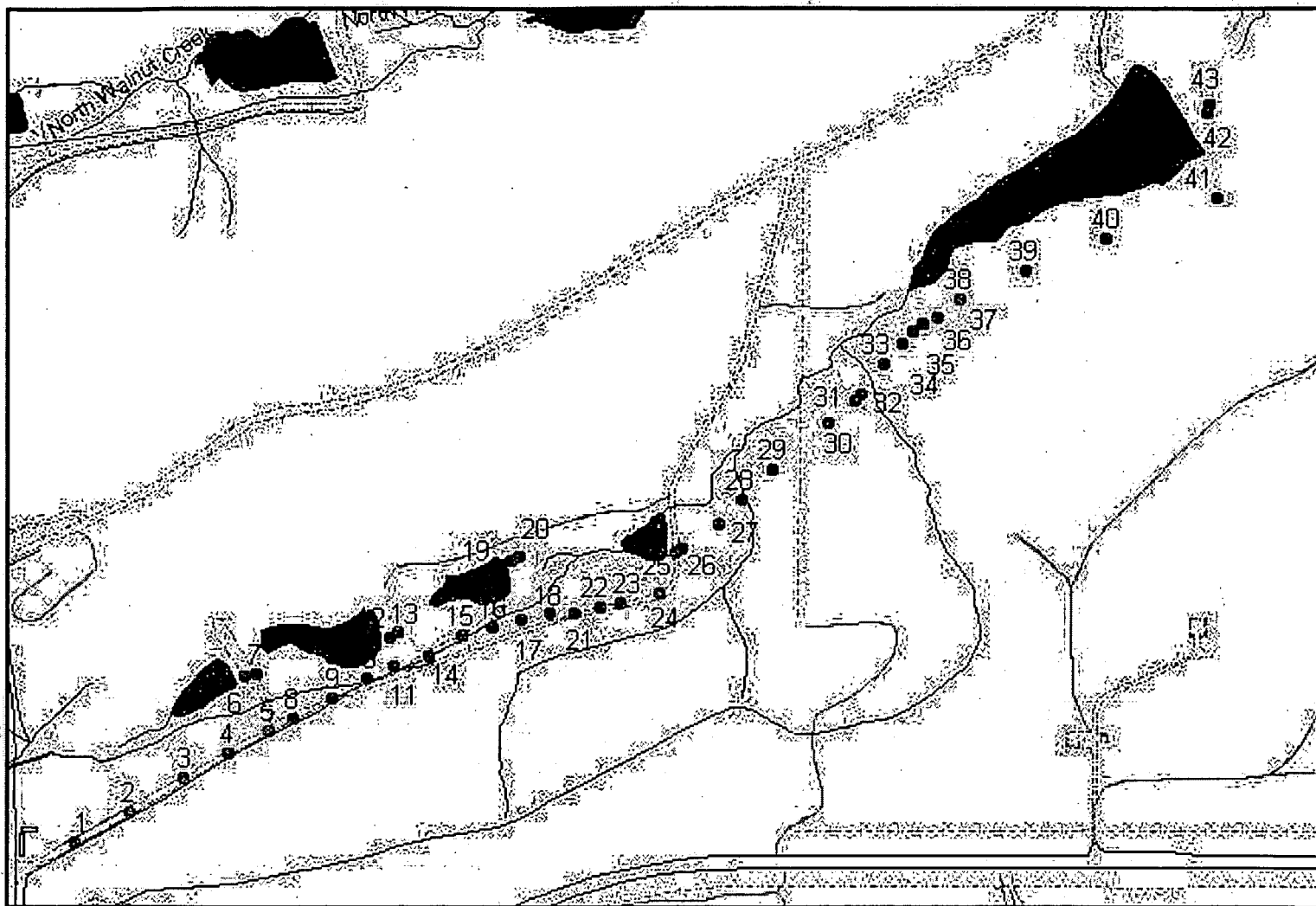
Pond Remediation

B-Series, Photopoints 1-10

6/28/2004

Photopoint 1
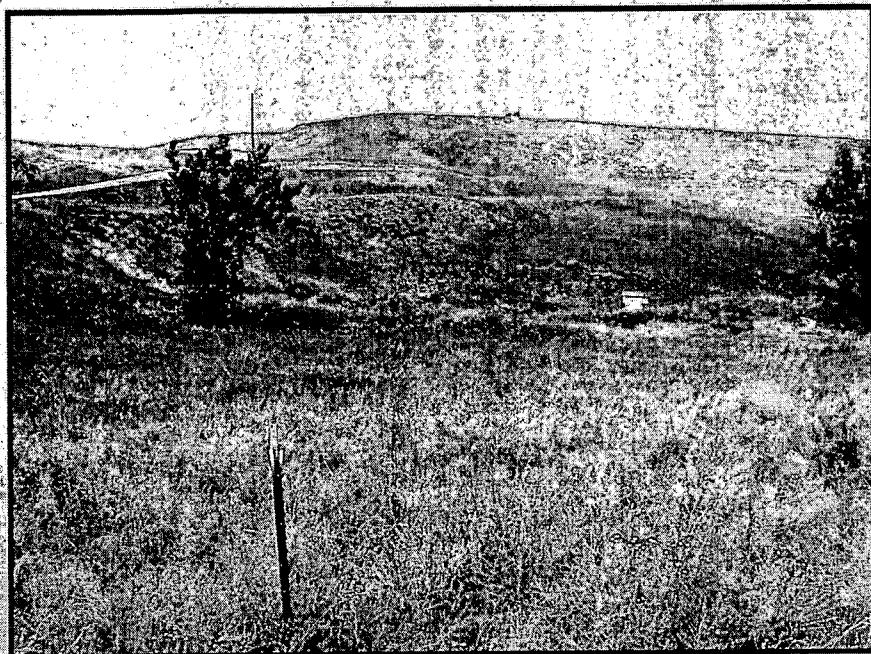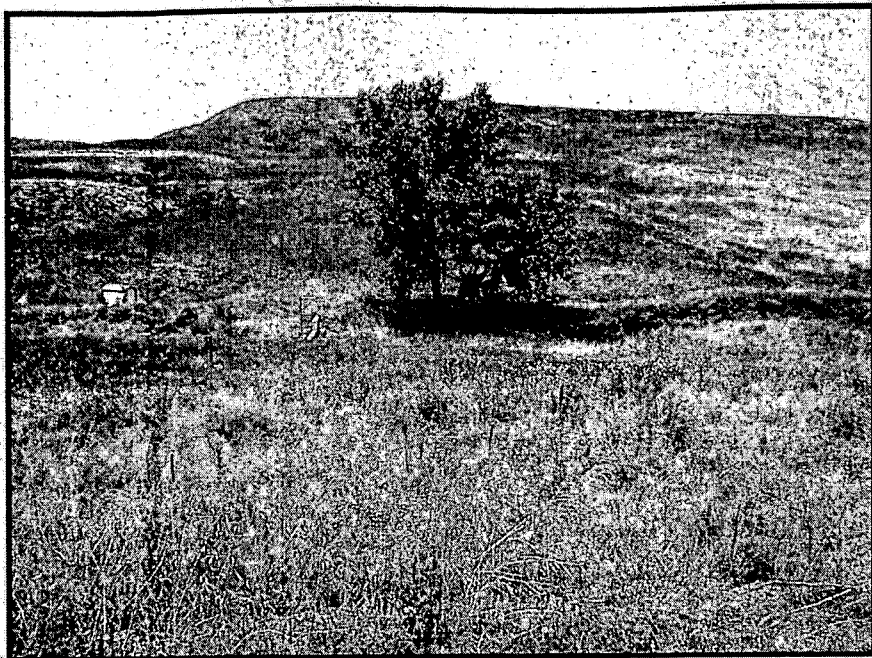
Photopoint 2

Photopoint 3

Photopoint 4
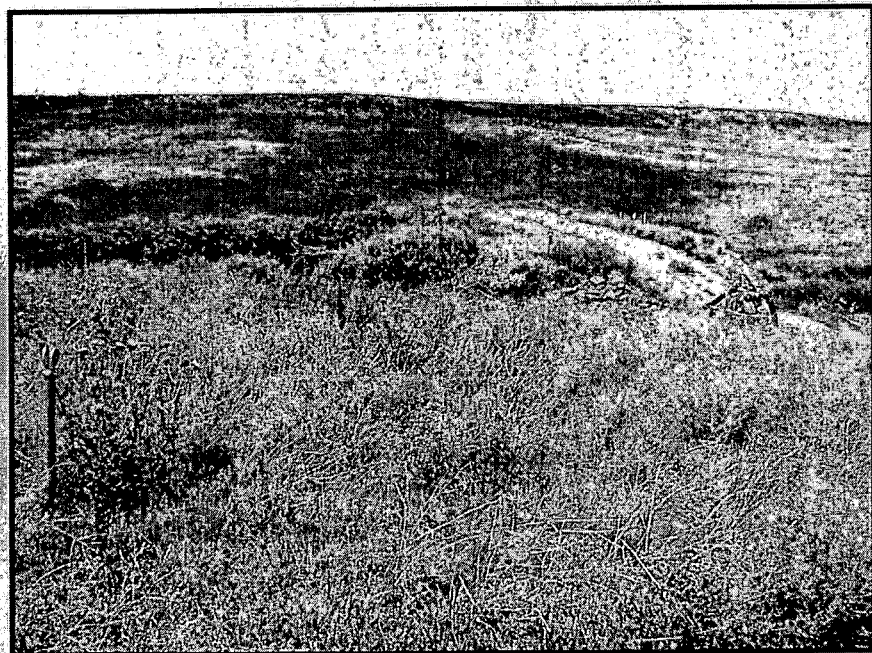
Photopoint 5

Photopoint 6 (B-1 Pond)
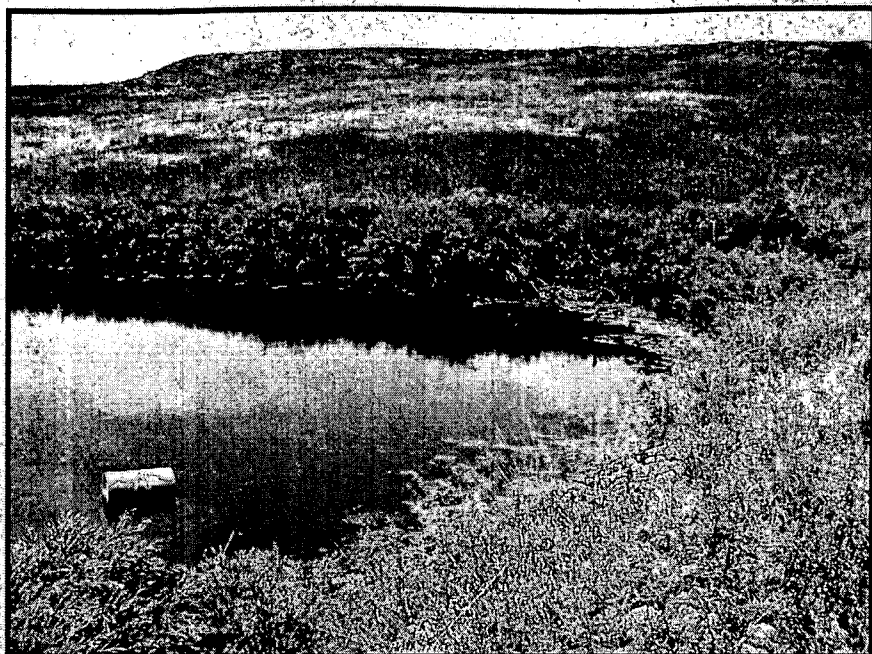
Photopoint 7 (B-2 Pond)
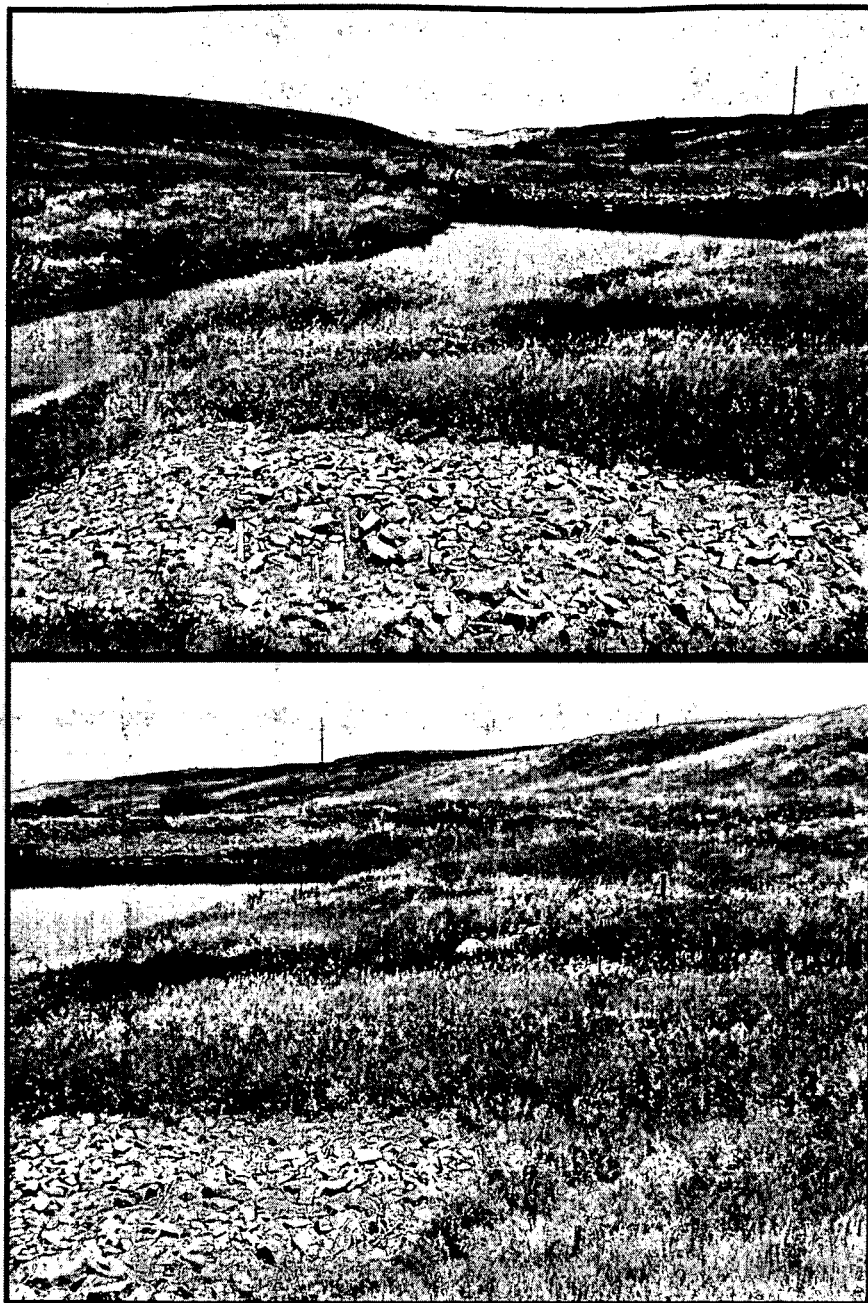
Photopoint 8

Photopoint 9
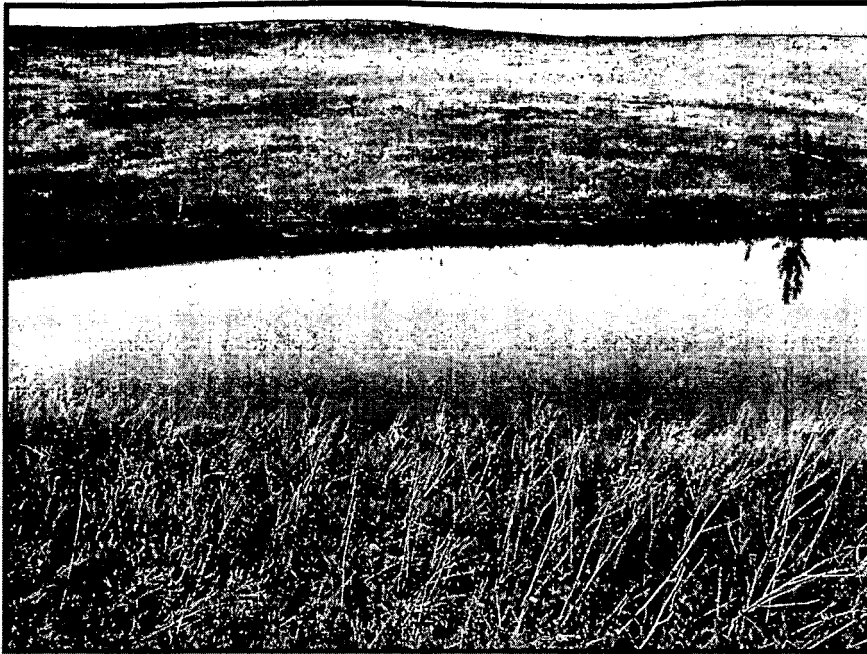
Photopoint 10

Pond Remediation

B-Series, Photopoints 11-18

6/28/2004

Photopoint 11
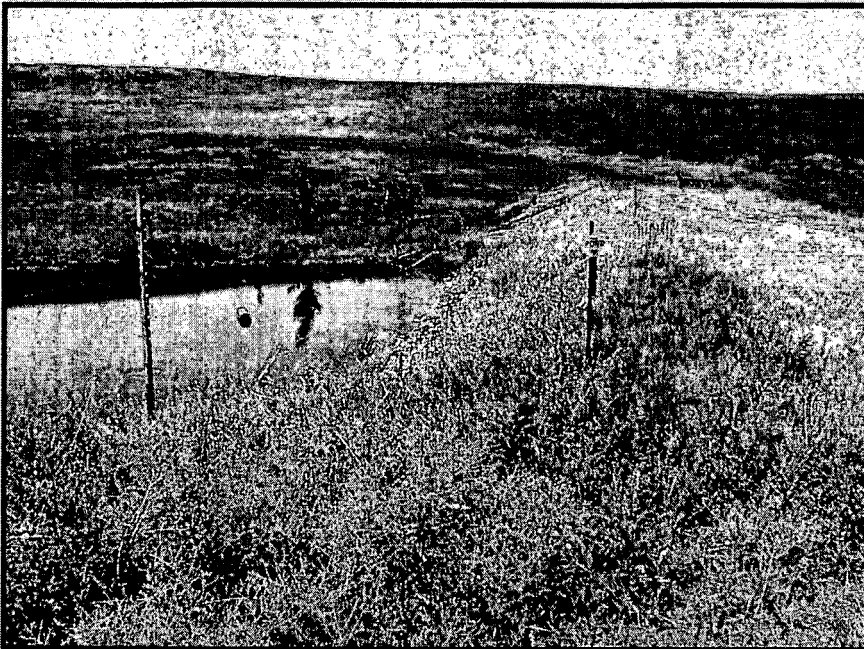
Photopoint 12 (B-2 Pond)

Photopoint 13 (B-3 Pond)
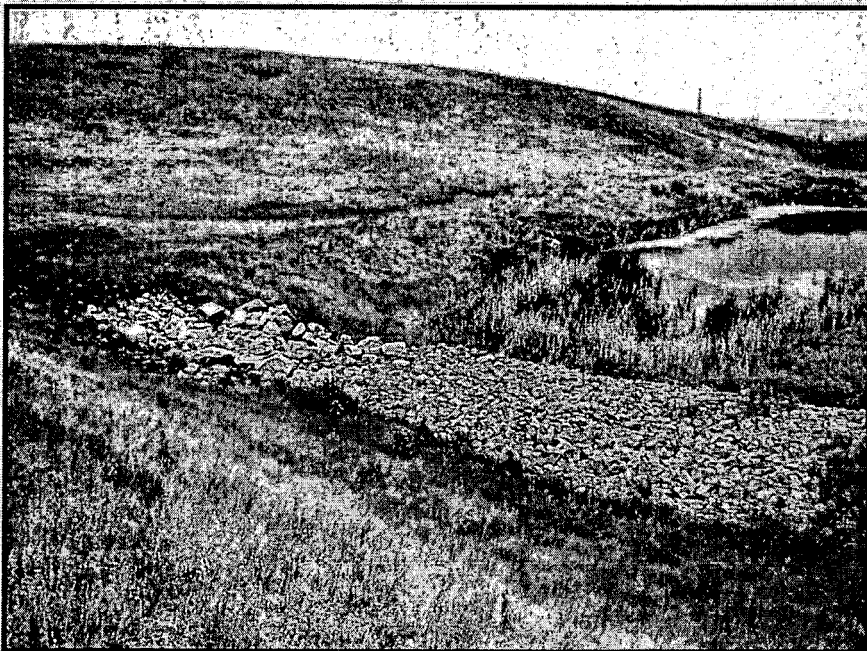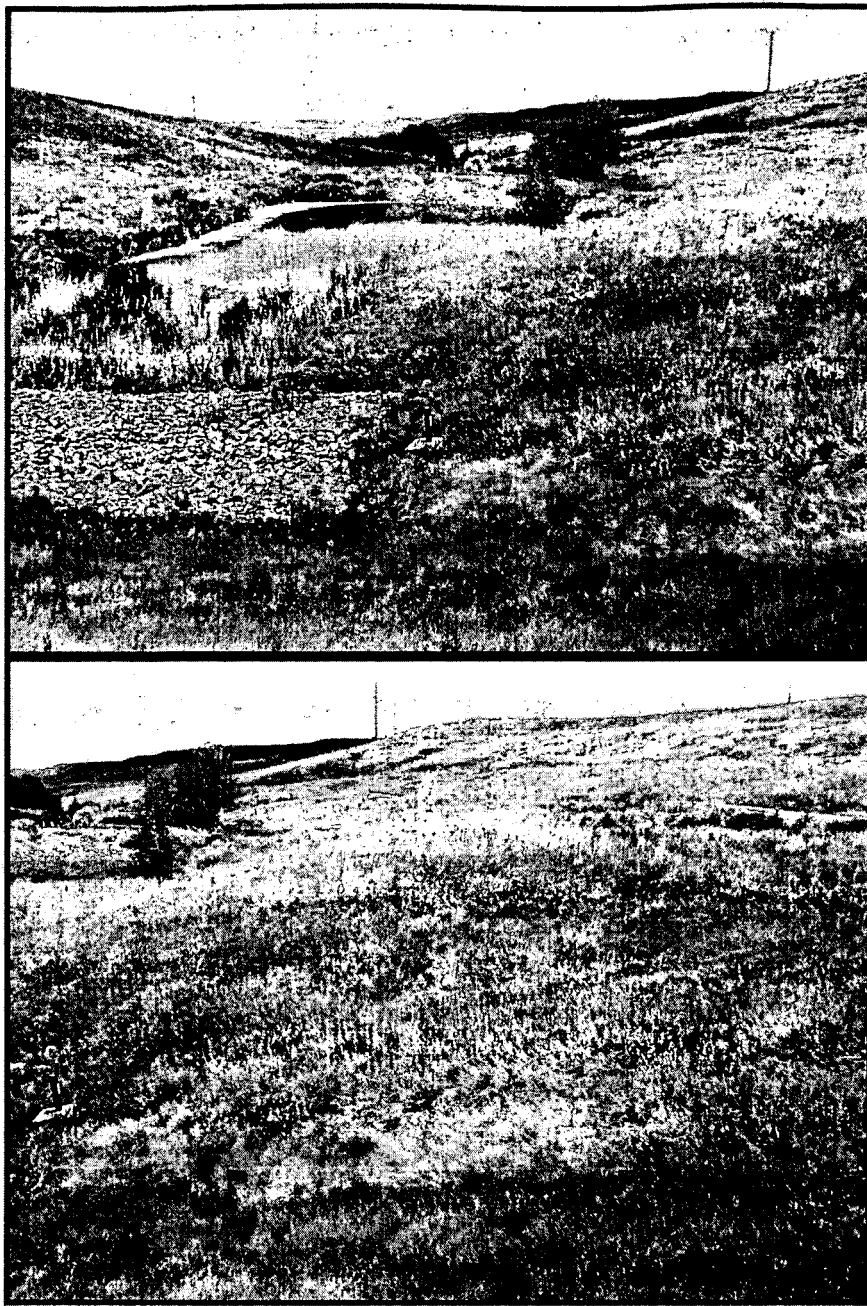
Photopoint 14
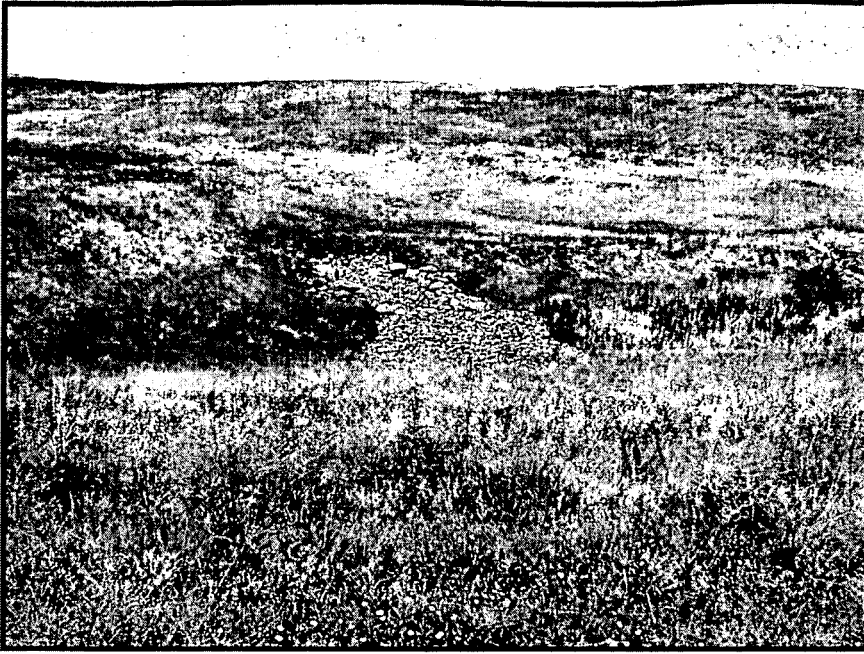
Photopoint 15
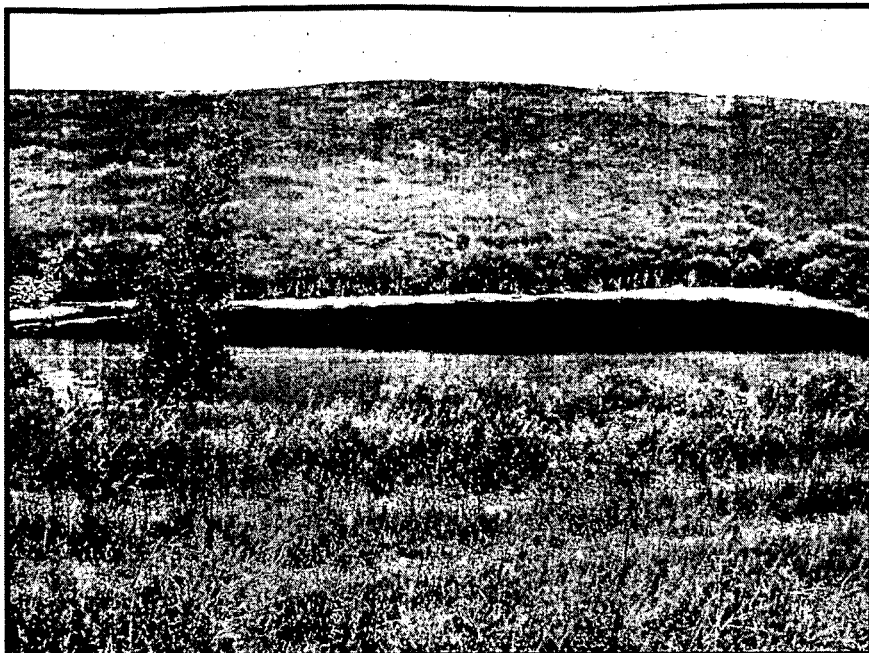
Photopoint 16

Photopoint 17
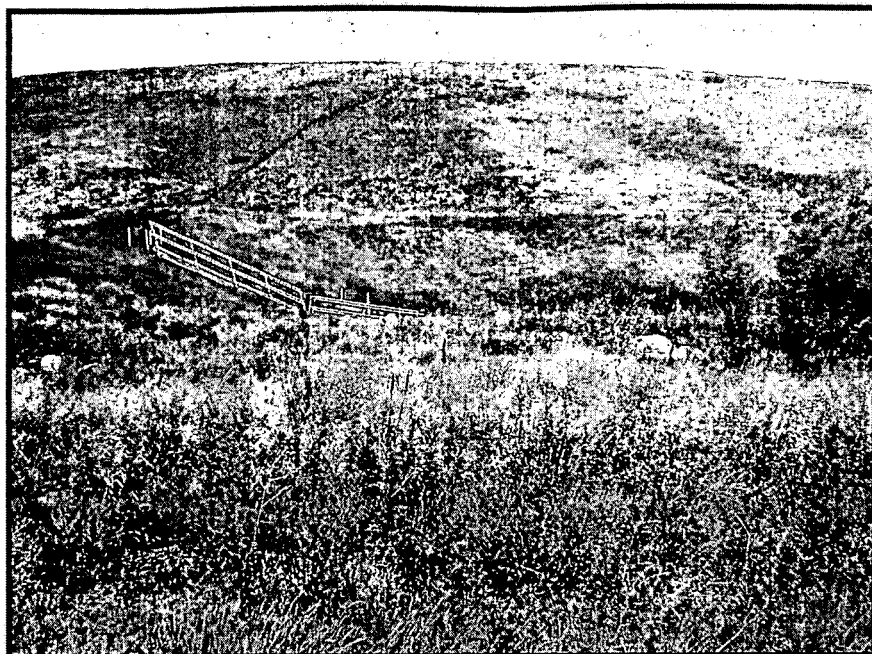
Photopoint 18

Pond Remediation

B-Series, Photopoints 19-26

6/28/2004

Photopoint 19 (B-3 Pond)
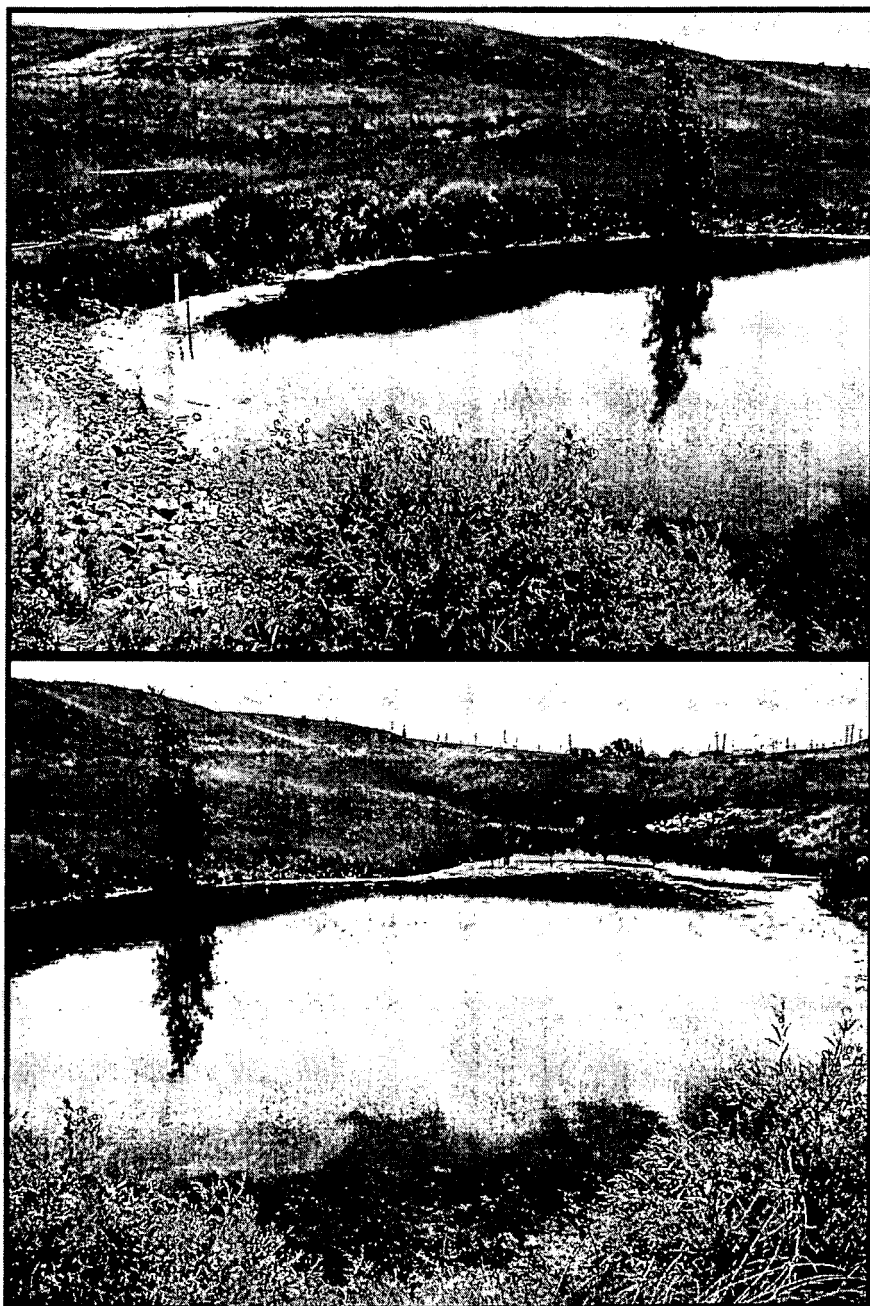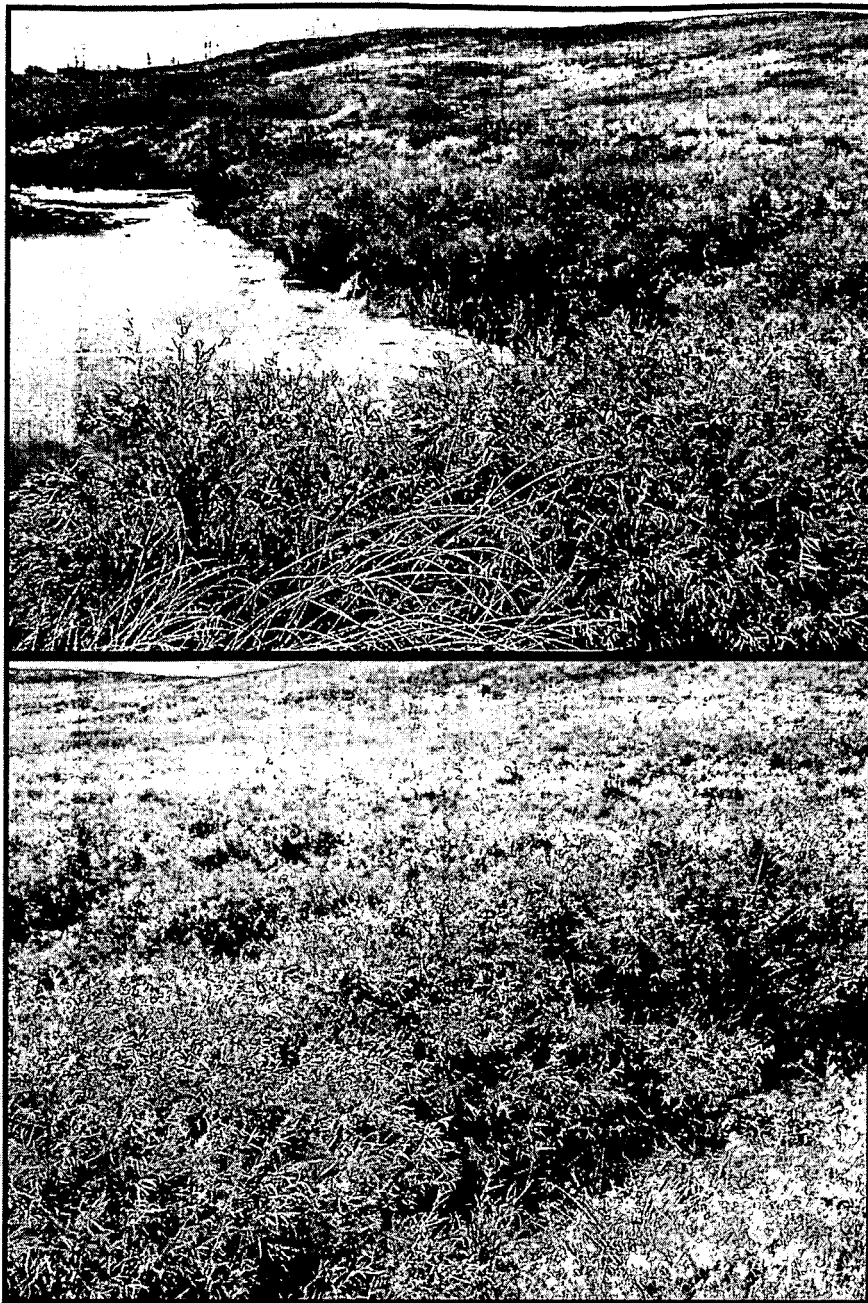
Photopoint 20
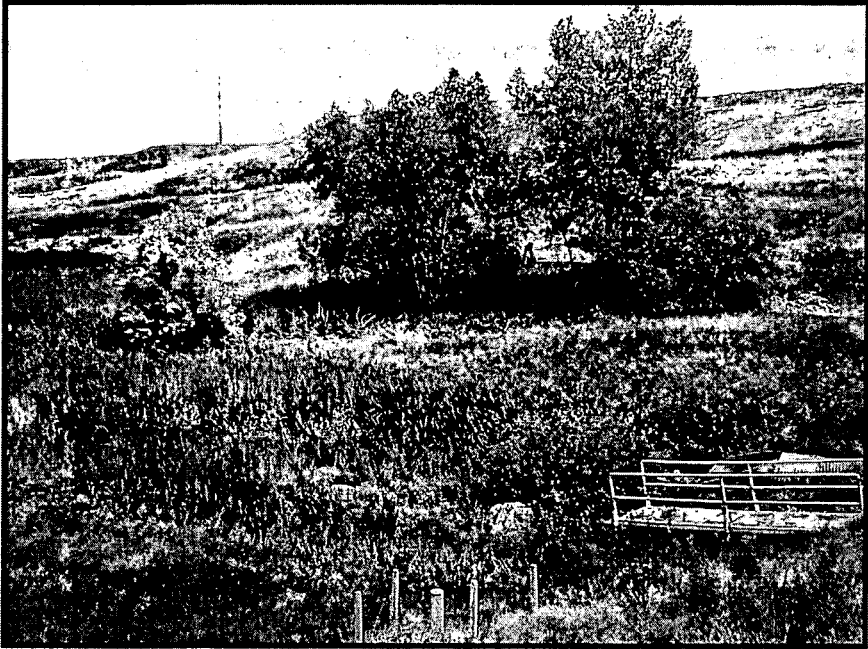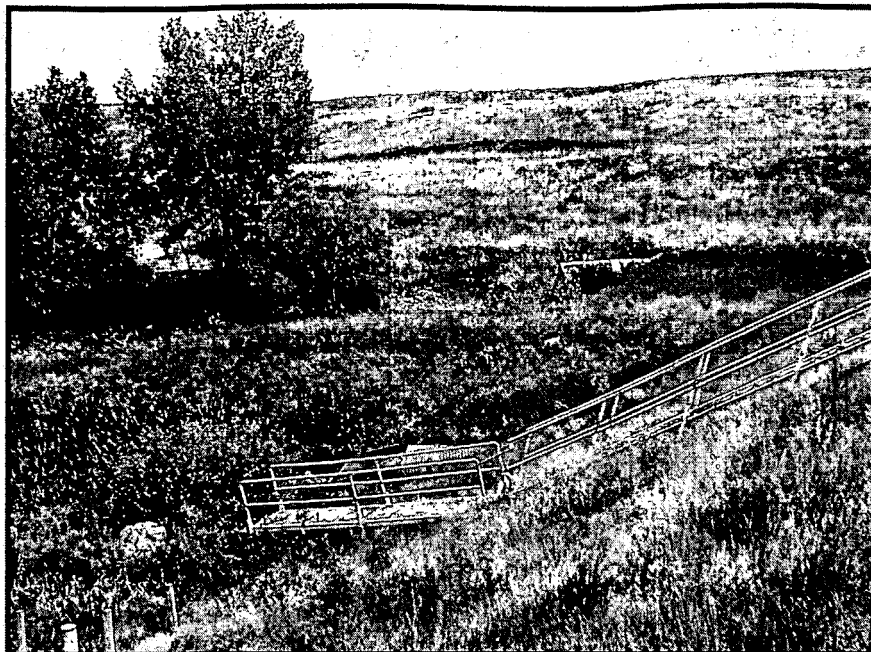
Photopoint 21
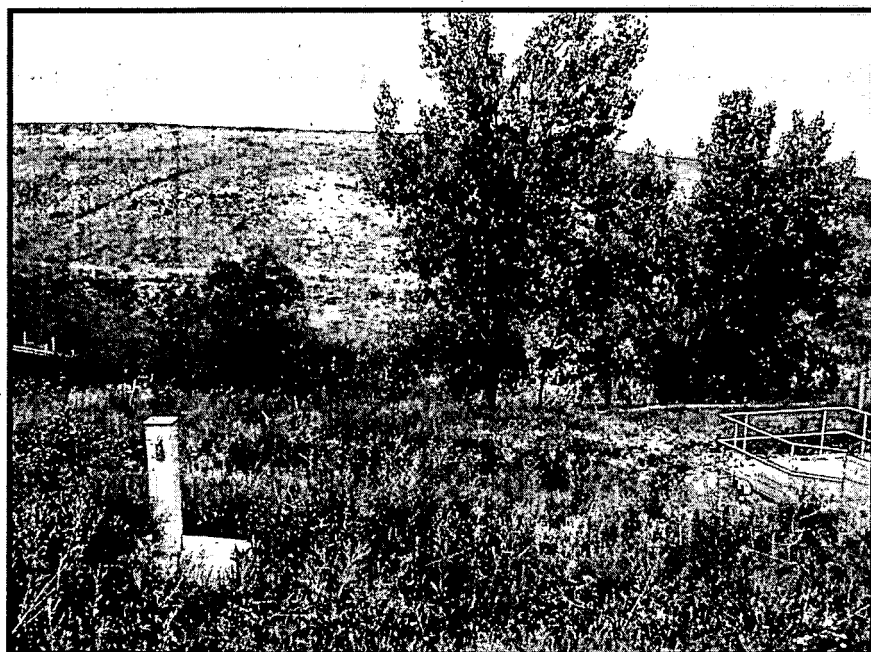
Photopoint 22
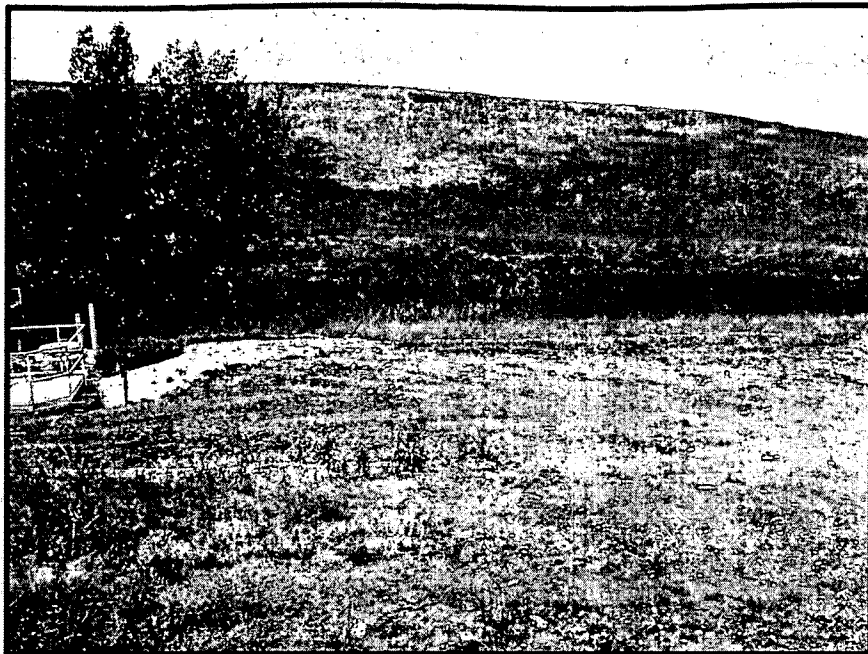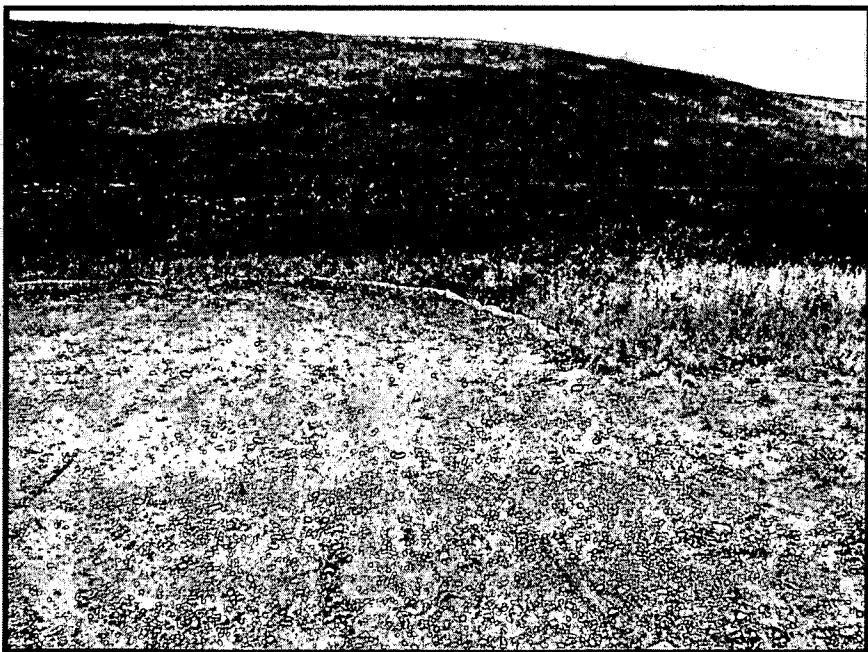
Photopoint 23

Photopoint 24

Photopoint 25 (B-4 Pond)

Photopoint 26
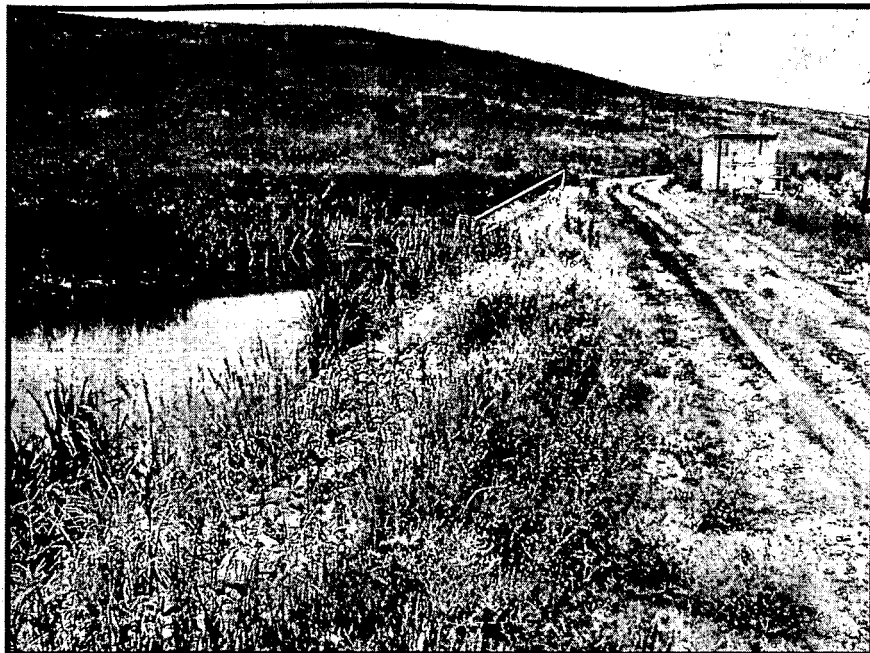
B-series remediation

Pond Remediation

B-Series, Photopoints 27-32

6/28/2004

Photopoint 27
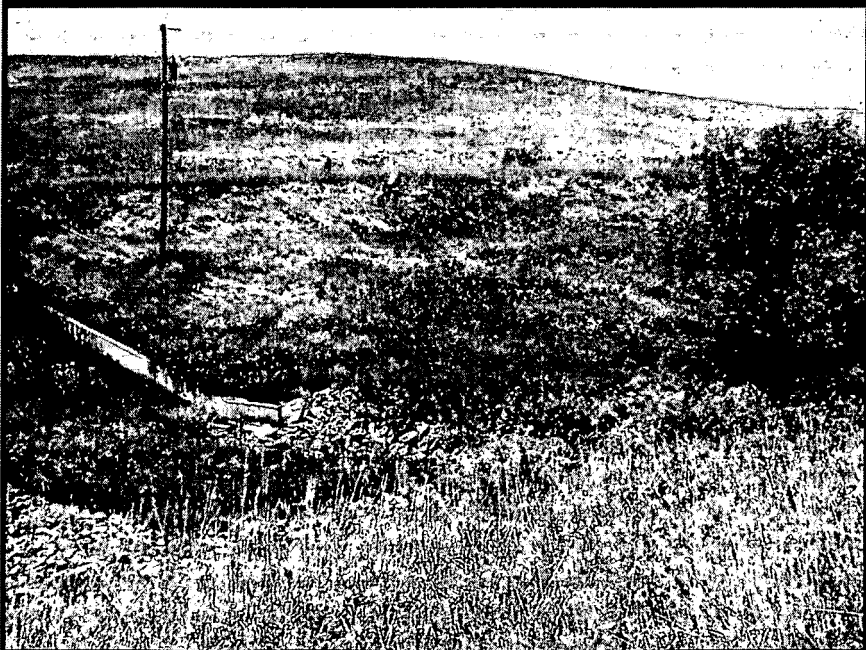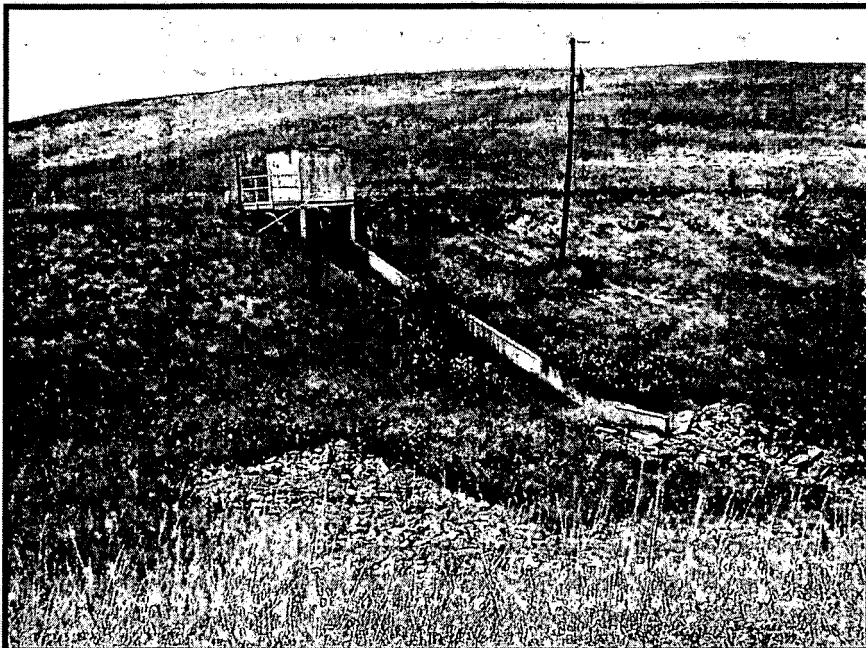
Photopoint 28
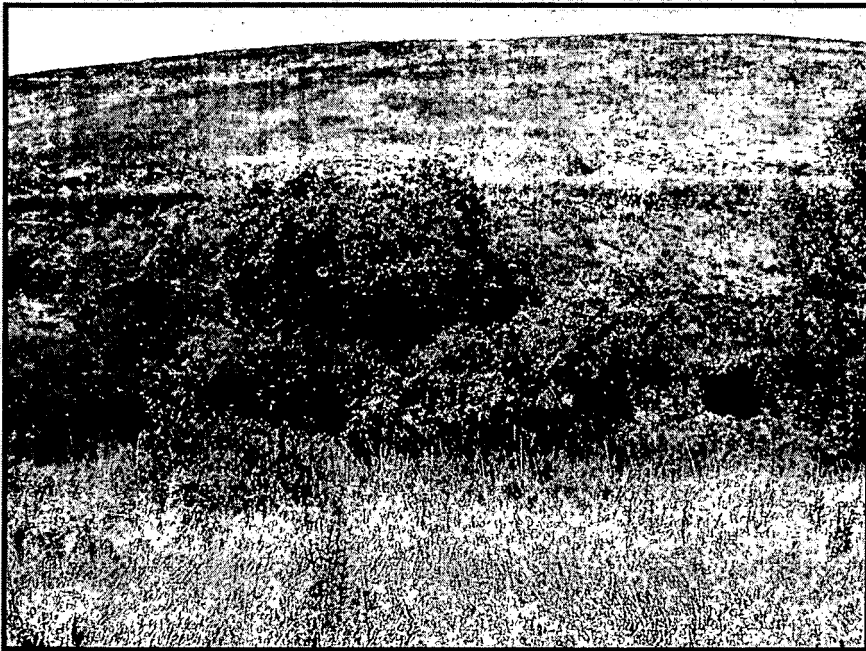
Photopoint 29

Photopoint 30

Photopoint 31
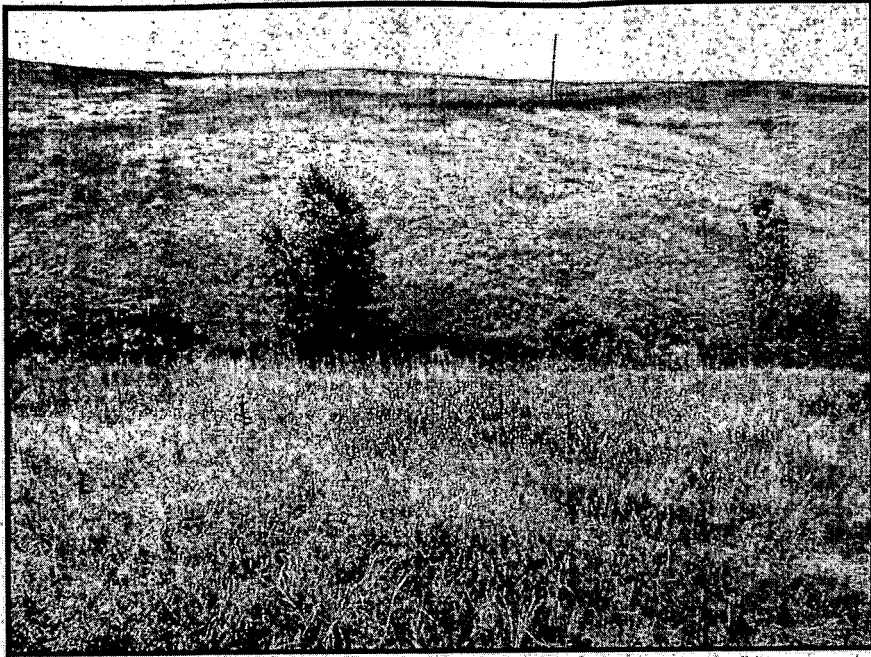
Photopoint 32

Pond Remediation

B-Series, Photopoints 33-39

6/28/2004

Photopoint 33
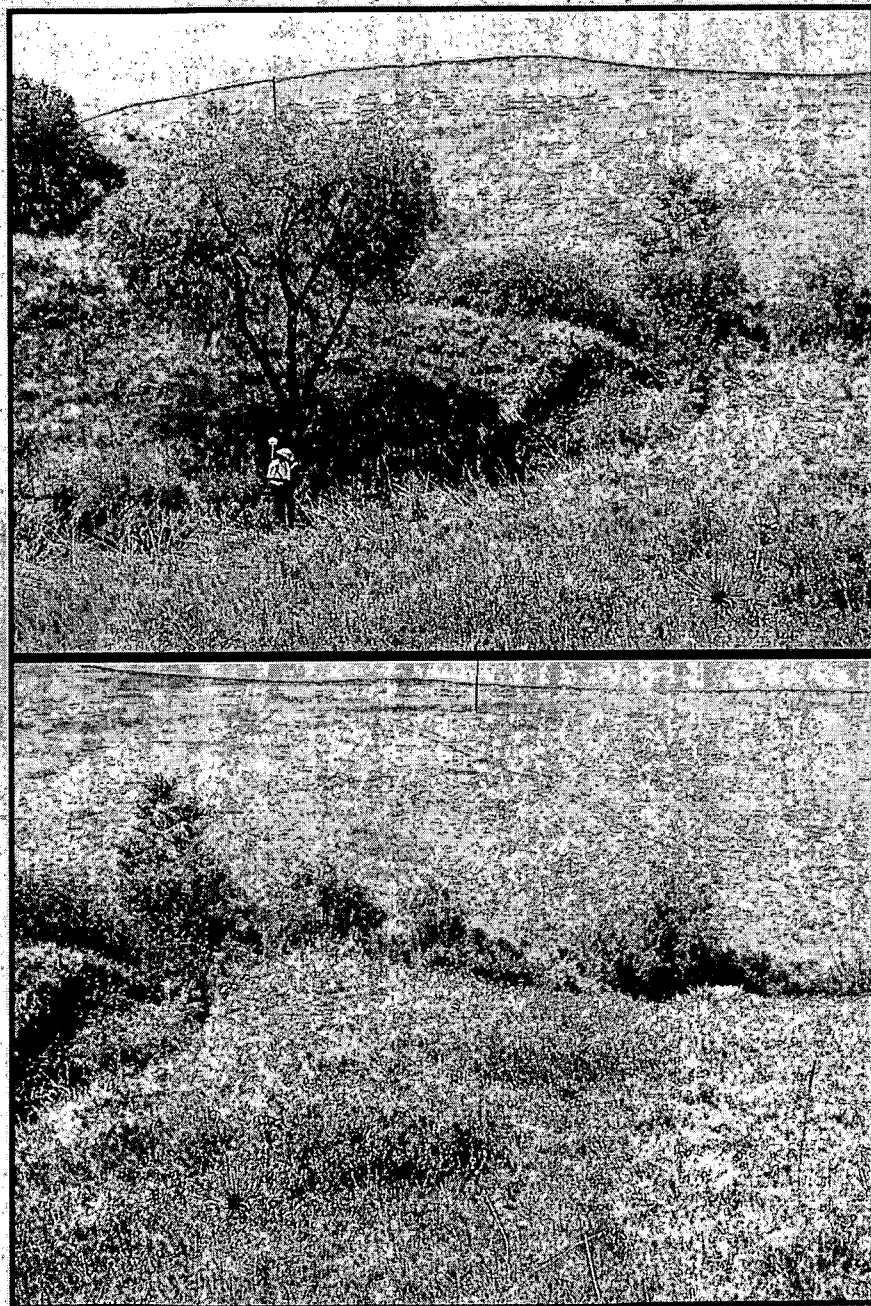
Photopoint 34
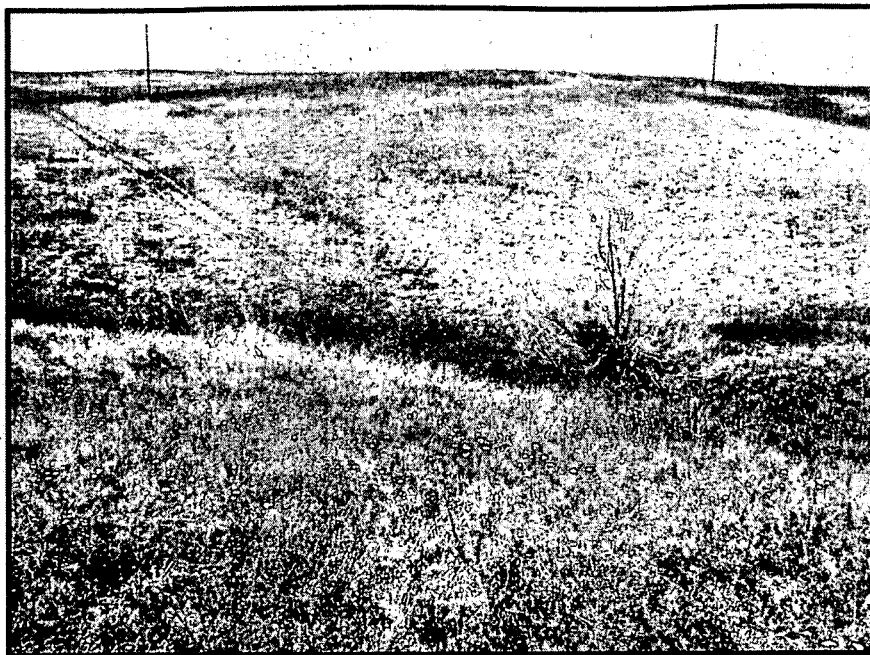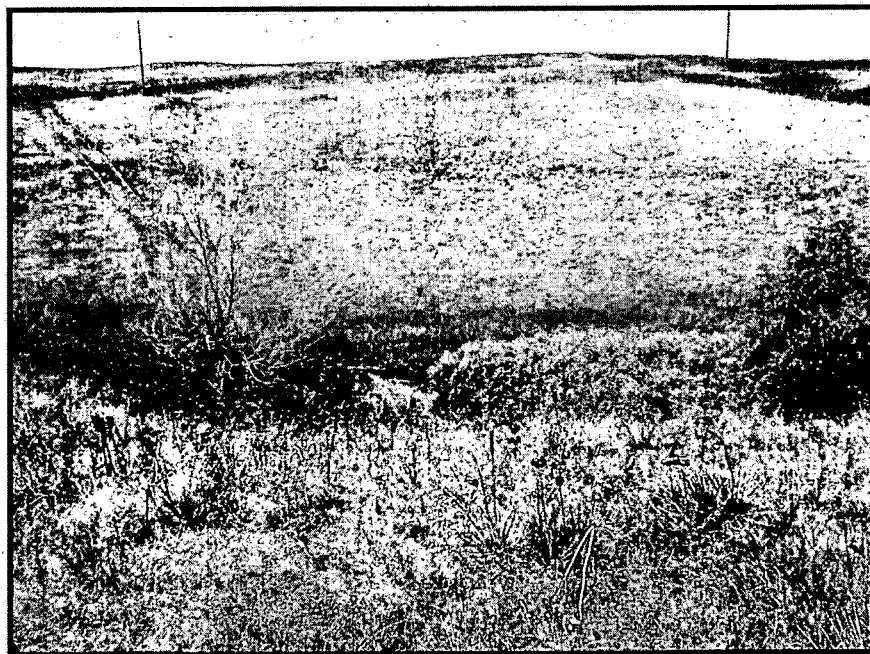
Photopoint 35

Photopoint 36

Photopoint 37

Photopoint 38

Photopoint 39 (B-5 Pond)

Pond Remediation

B-Series, Photopoints 40-43
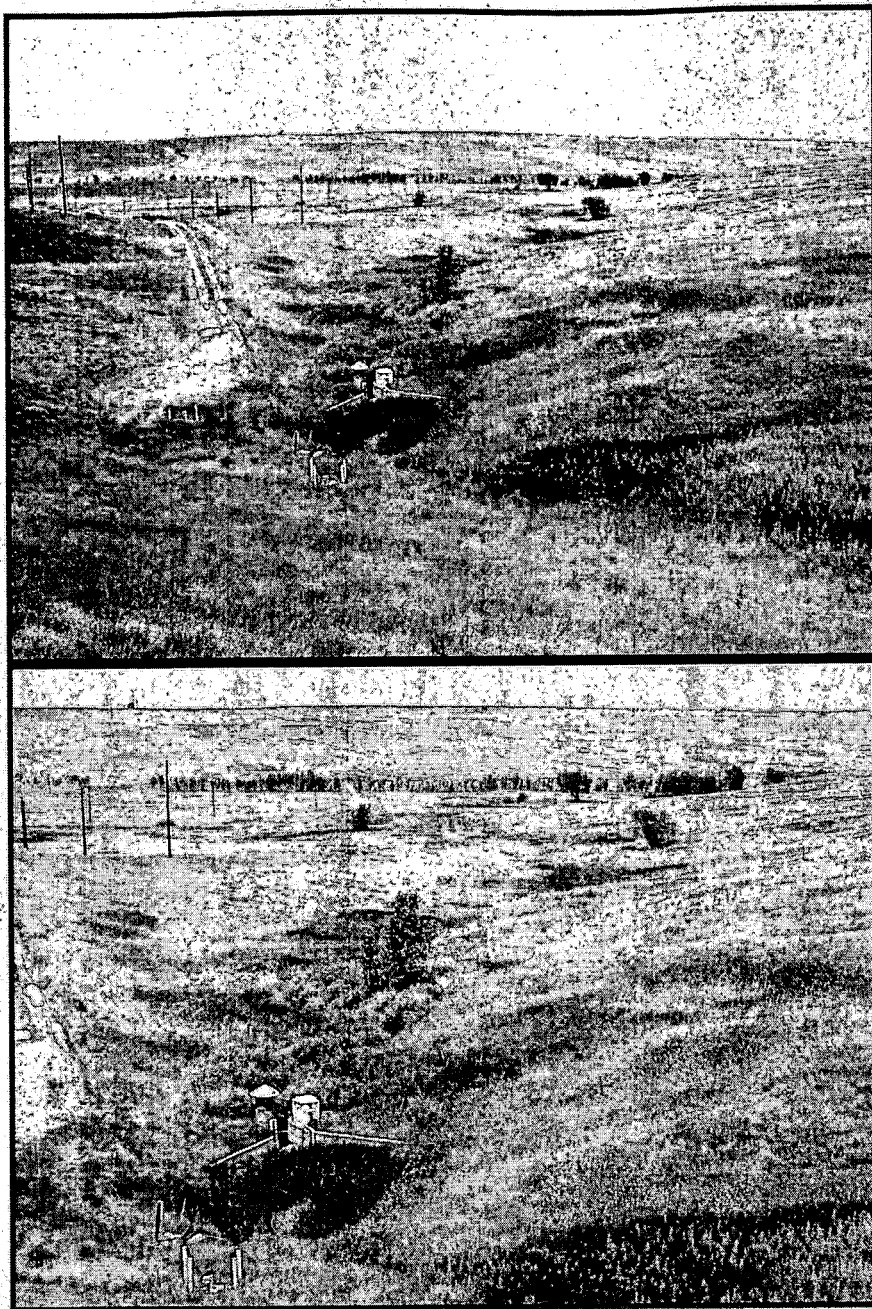
6/28/2004

Photopoint 40
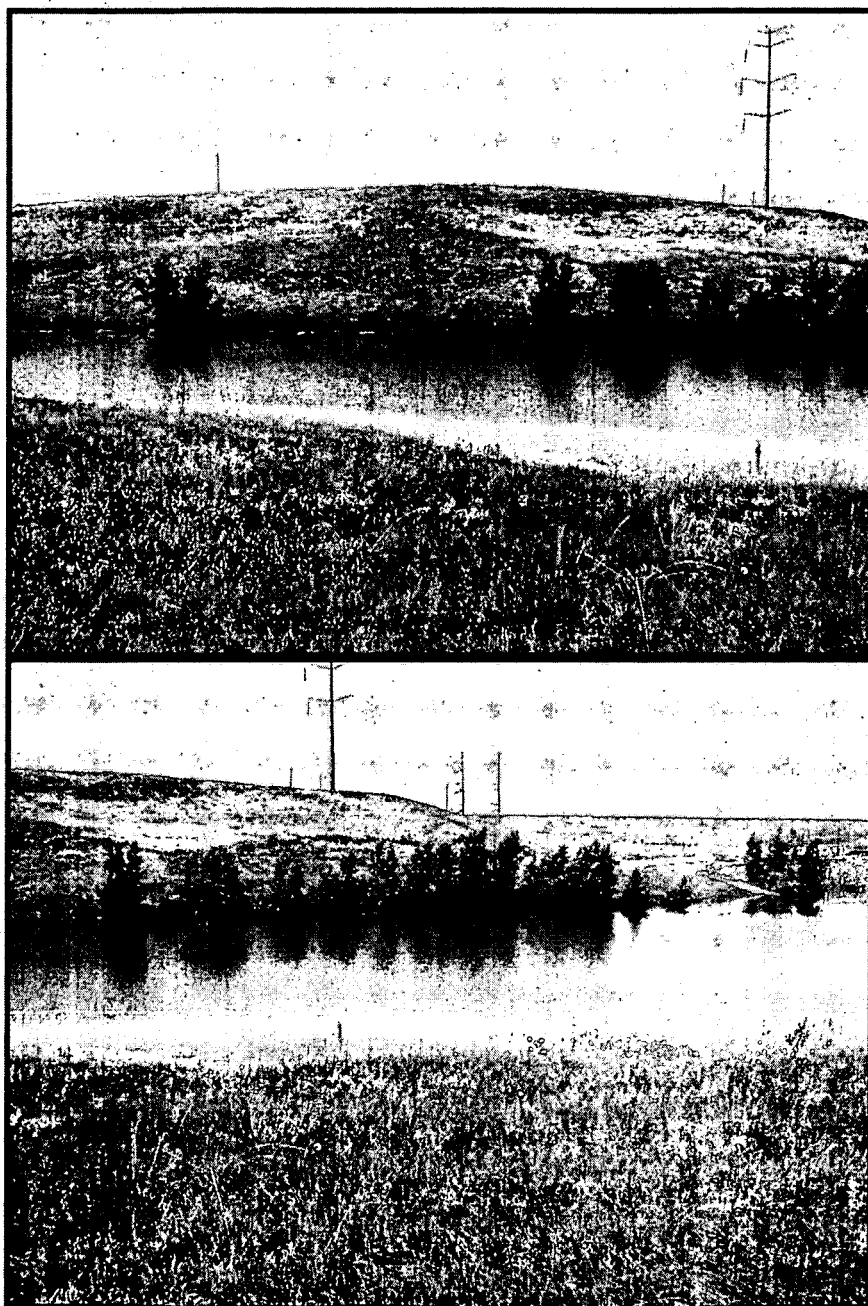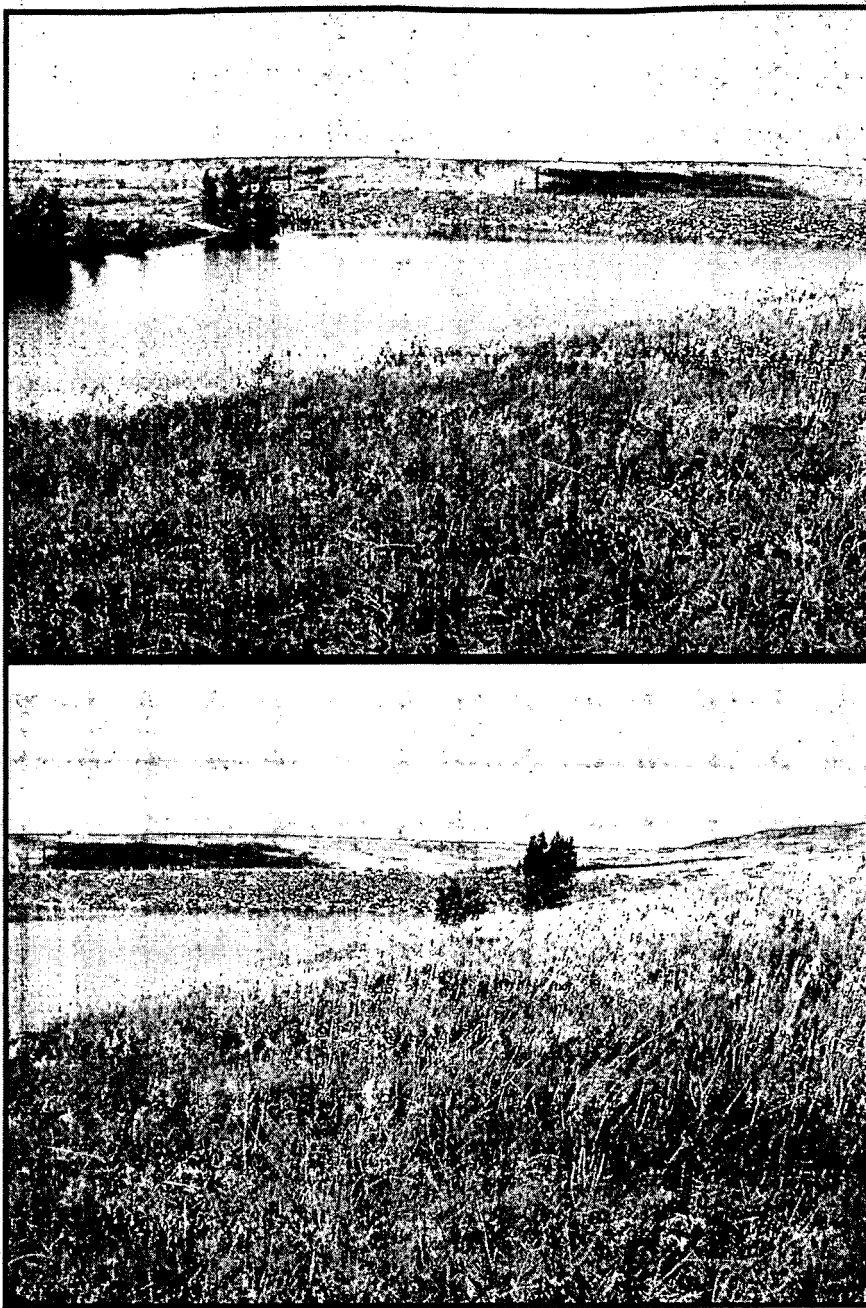
Photopoint 41
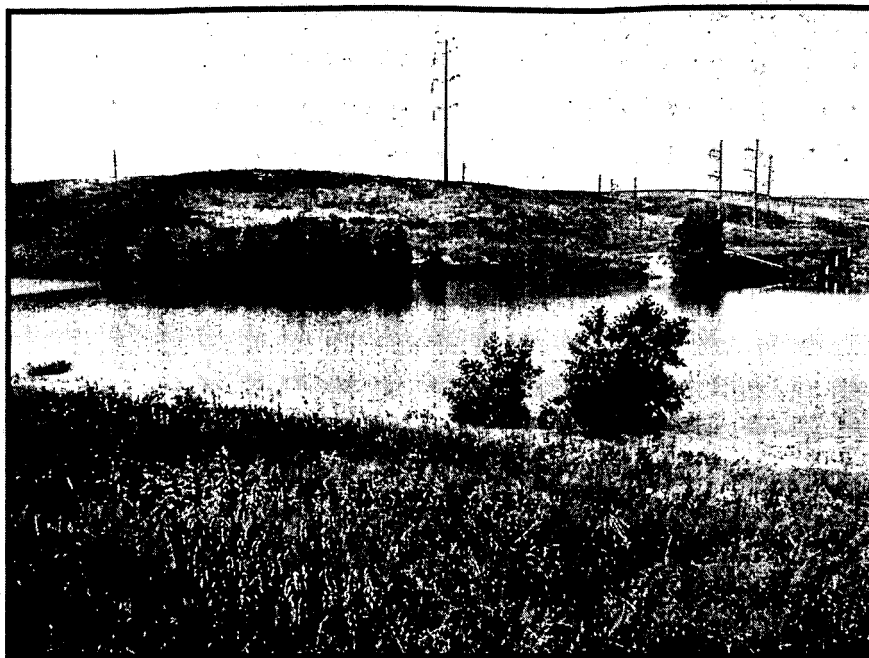
Photopoint 42 (B-5 Pond)
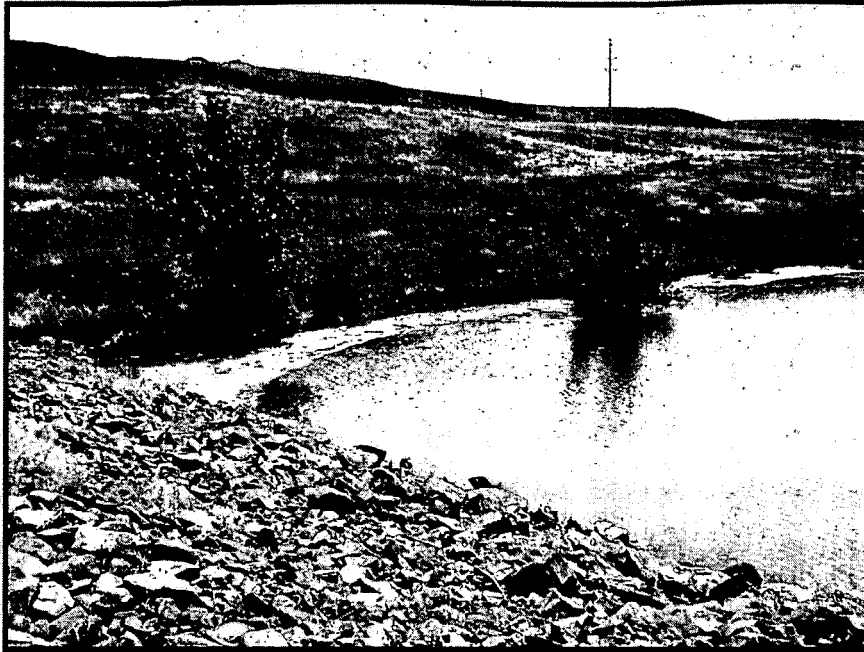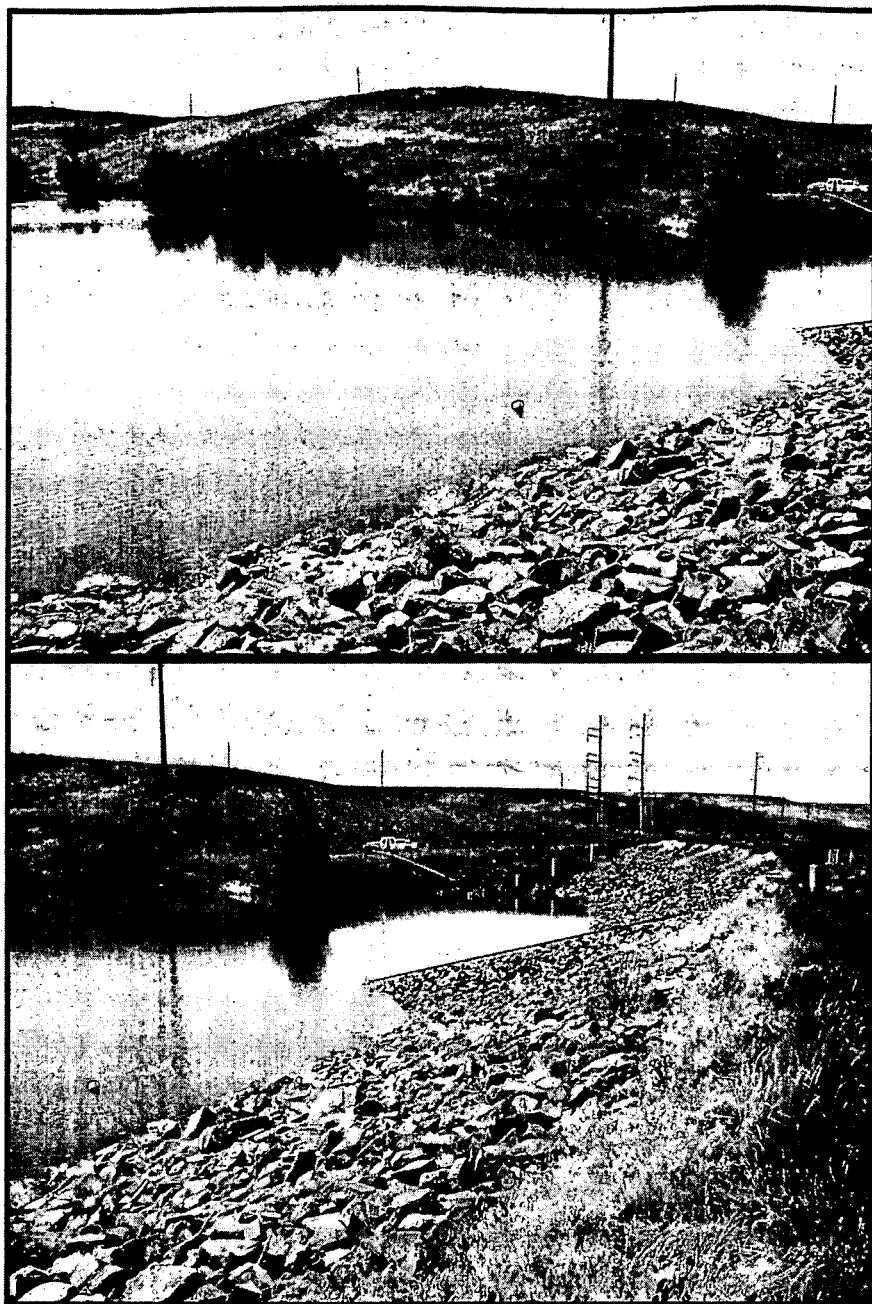
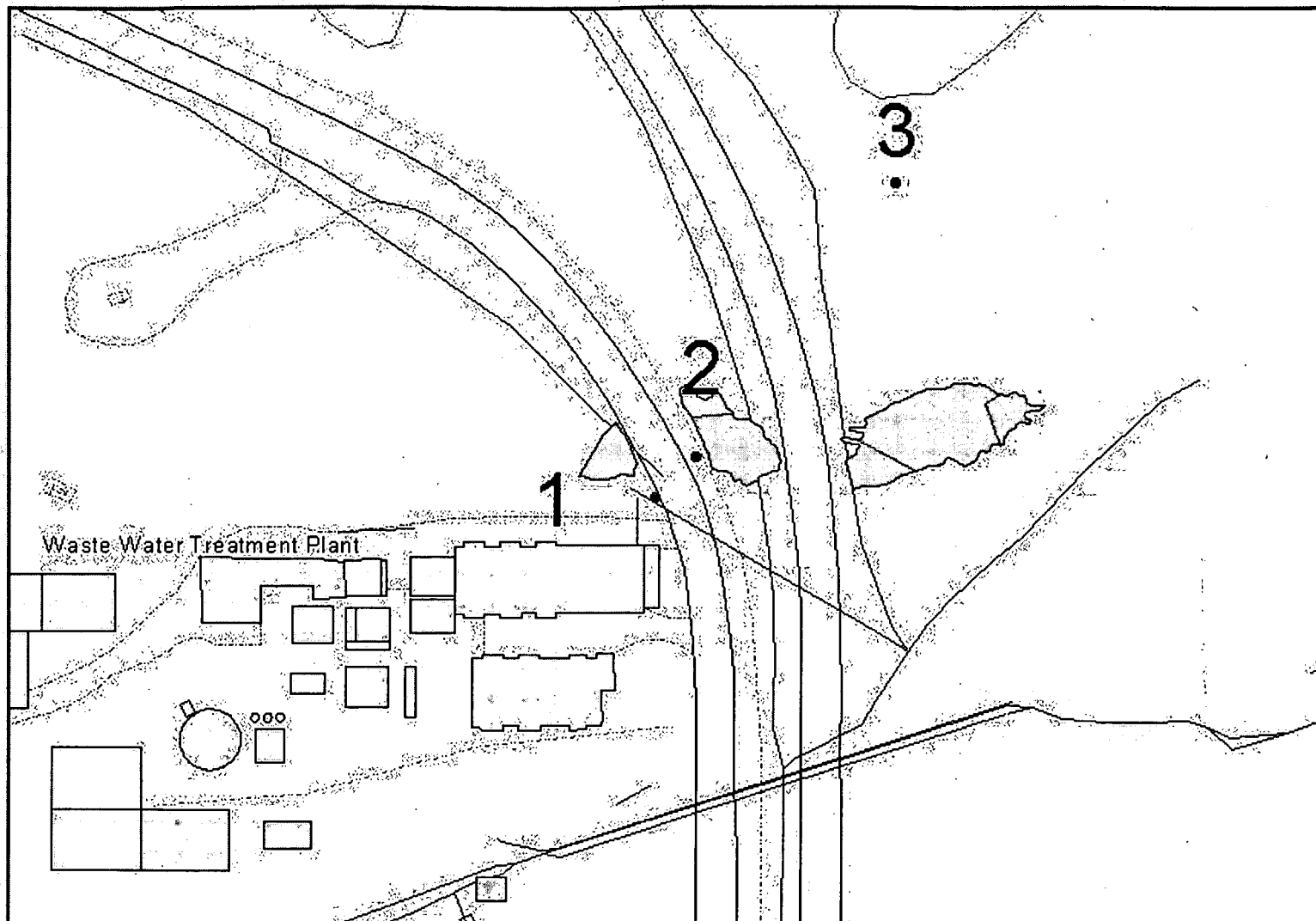Photopoint 43

Old Process Waste Line

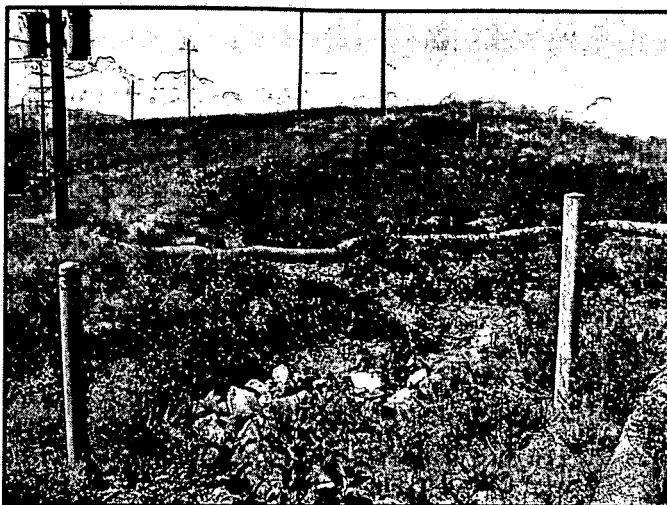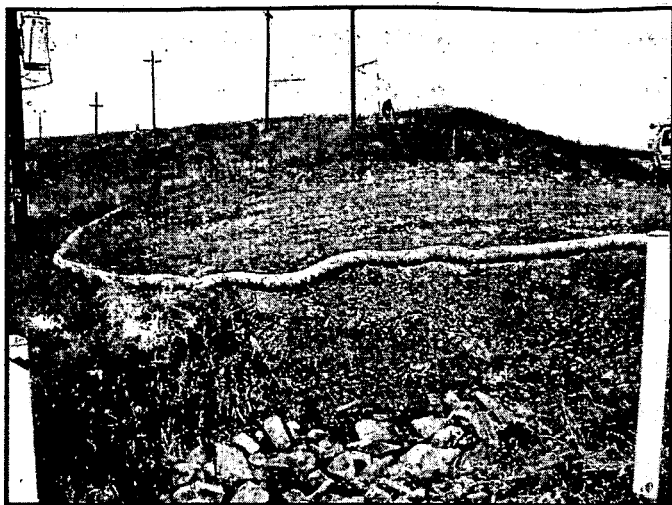(clicking on any photopoint on the map will take you to the corresponding monitoring photos)

Photopoint 1

05/2004   09/2004

Photopoint 2
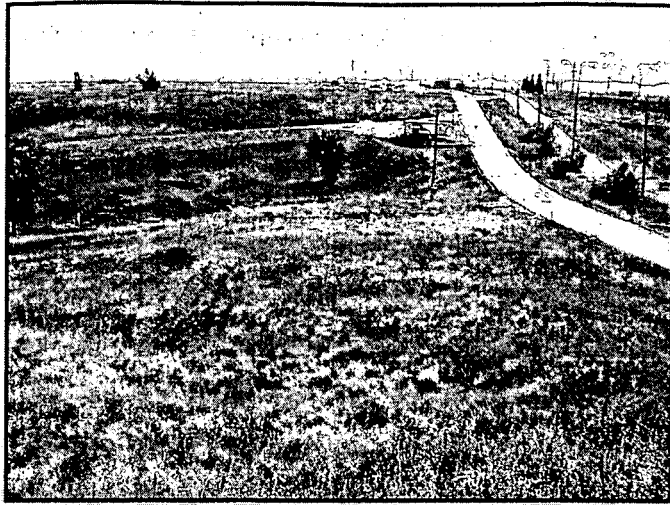
05/2004   09/2004
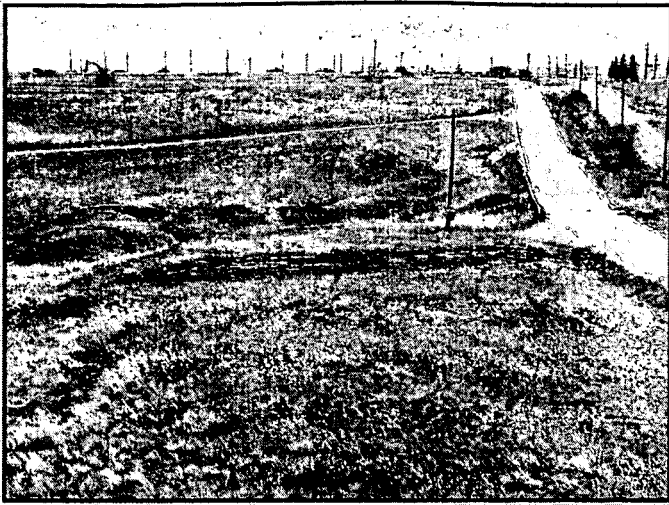

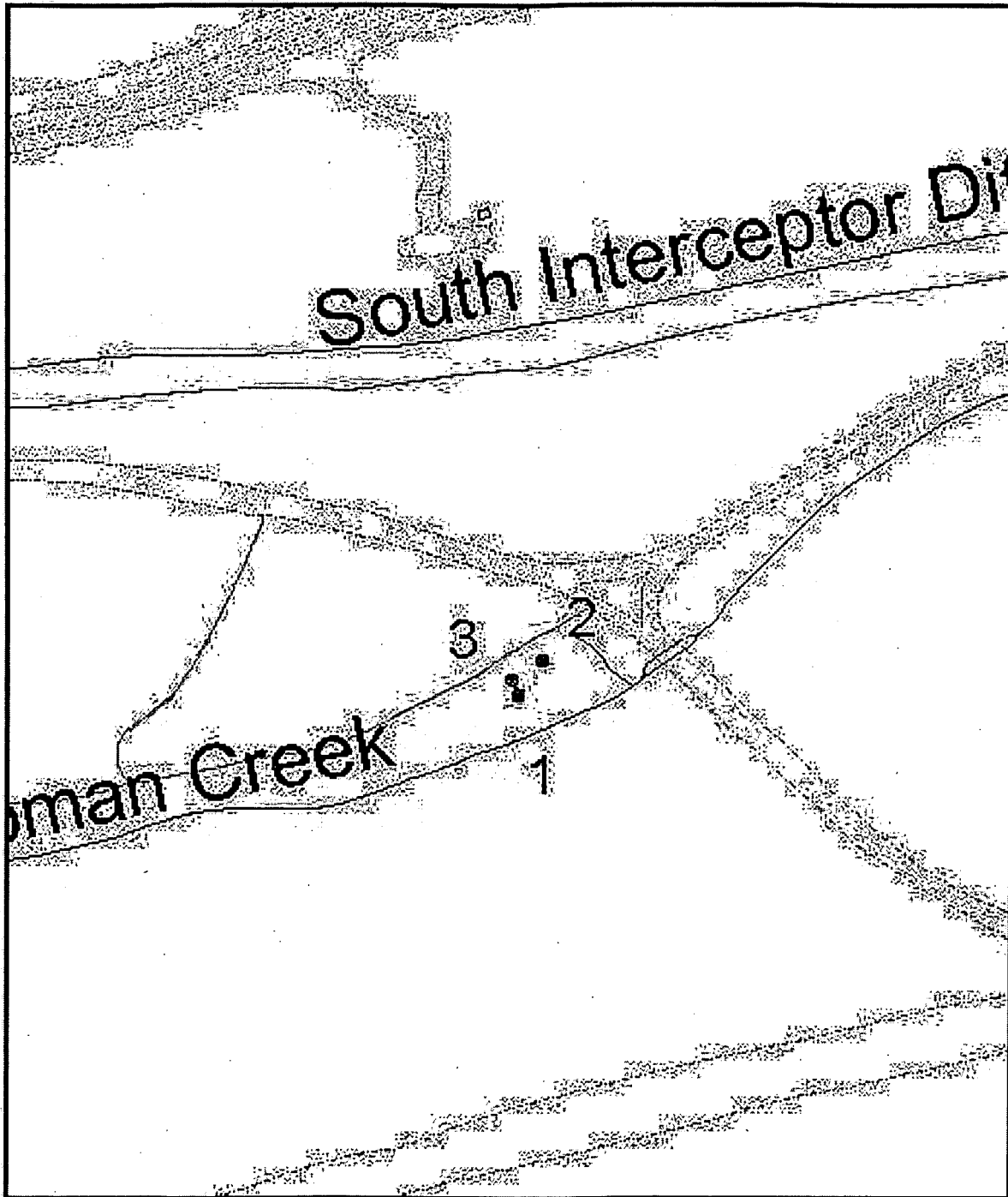Photopoint 3

05/2004   09/2004

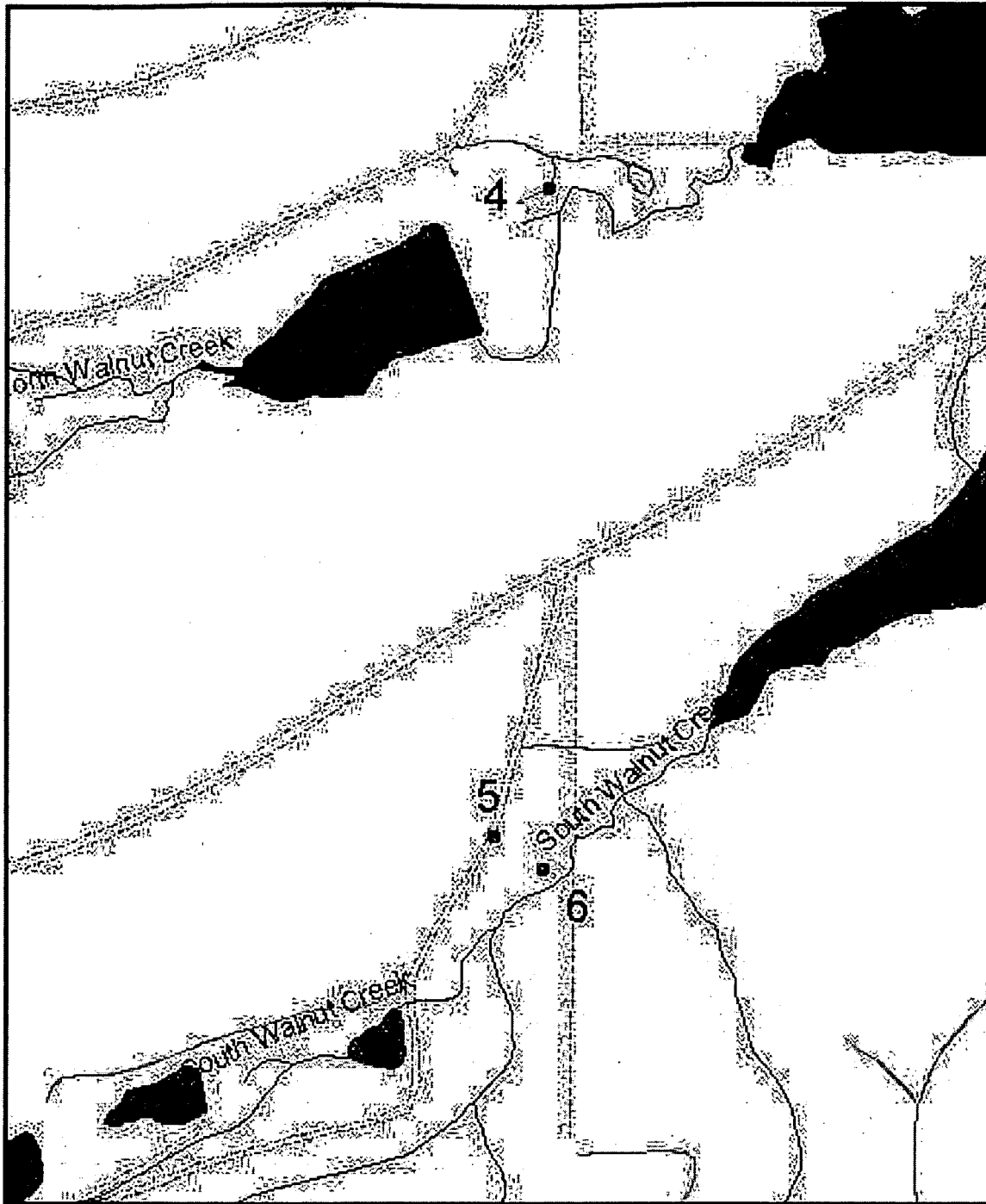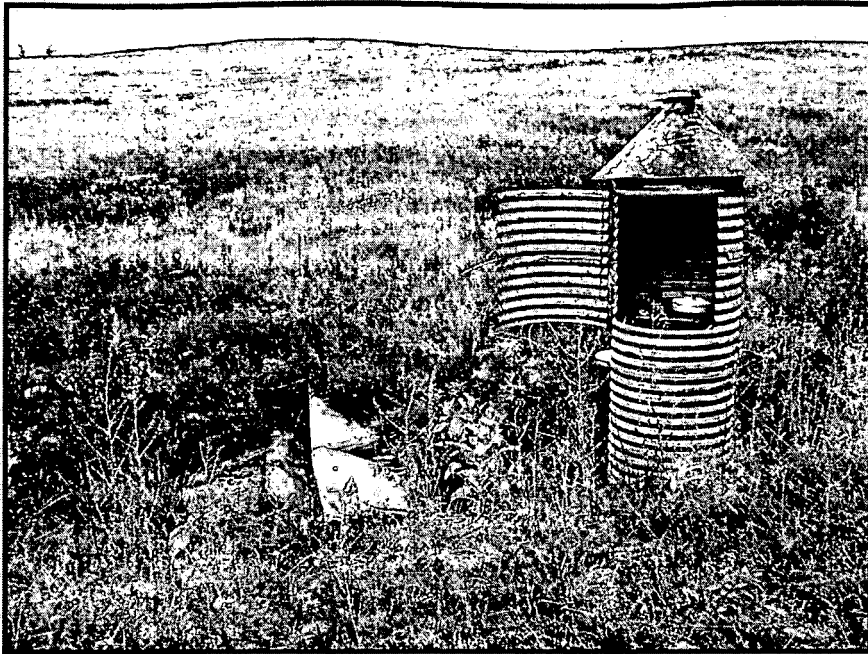# Surface Water Equipment Removal

(clicking on any photopoint on the map will take you to the corresponding monitoring photos)

Photopoint 1

Photopoint 2
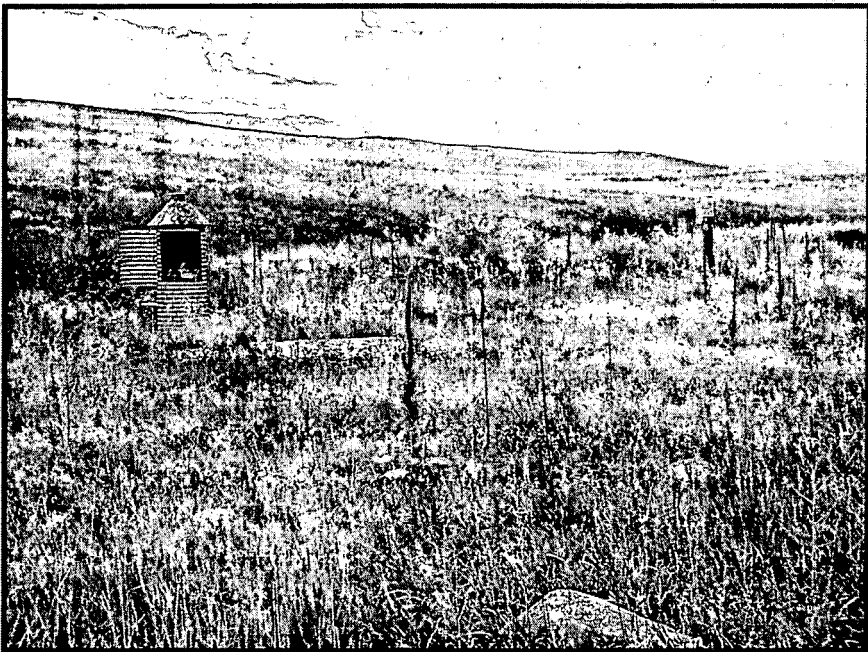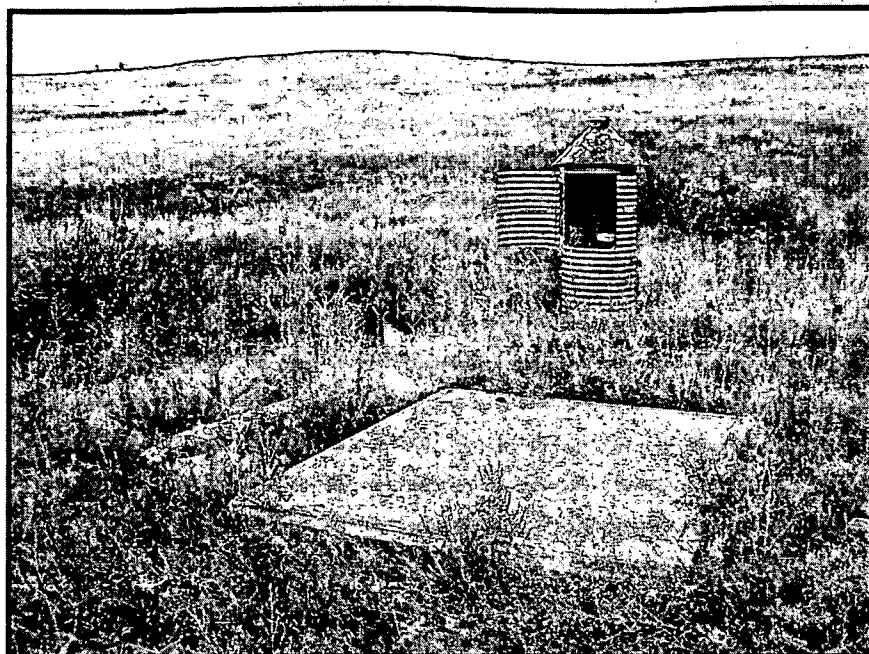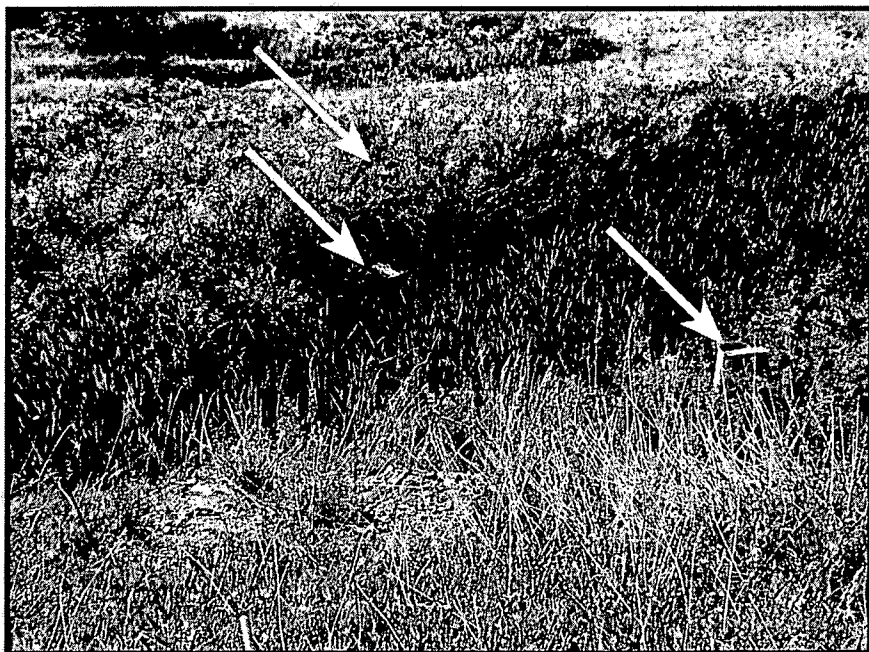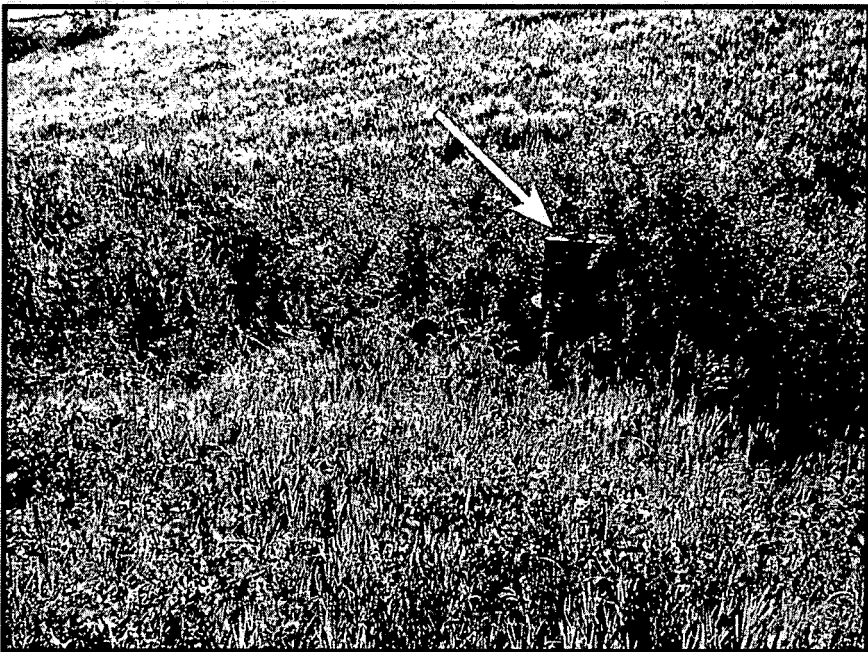

Photopoint 3

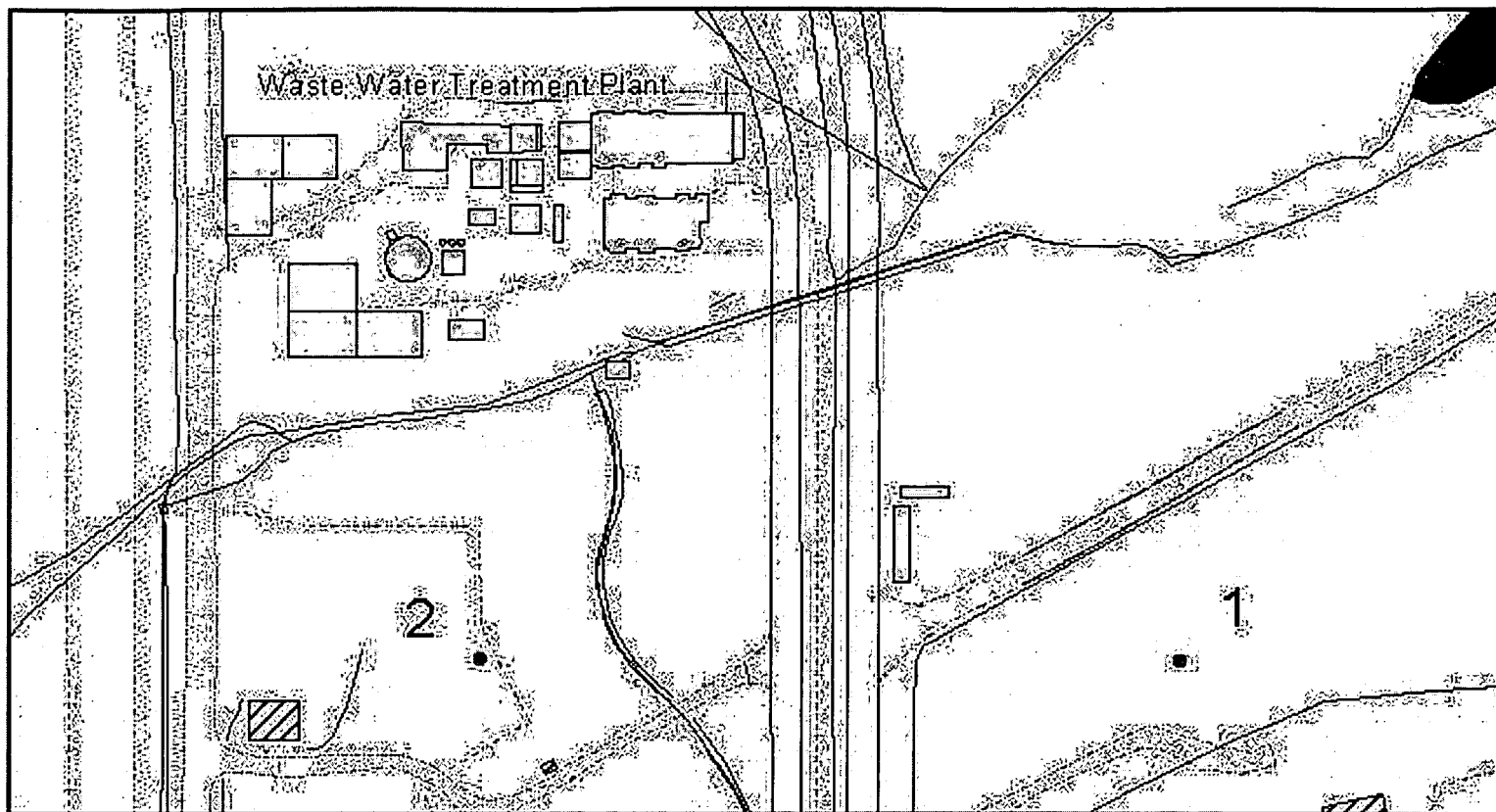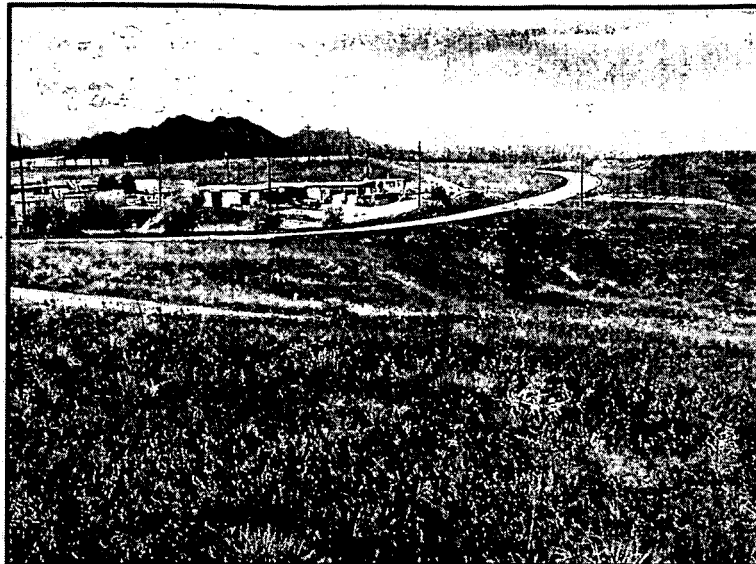**Photopoint 4**

Photopoint 5

Photopoint 6

Waste Water Treatment Plant

(clicking on any photopoint on the map will take you to the corresponding monitoring photos)

07/27/04

Photopoint 1
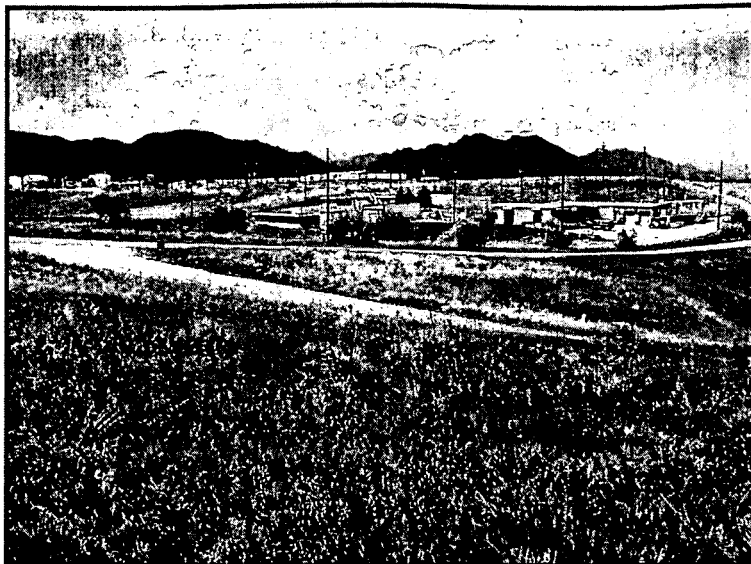
Photopoint 2
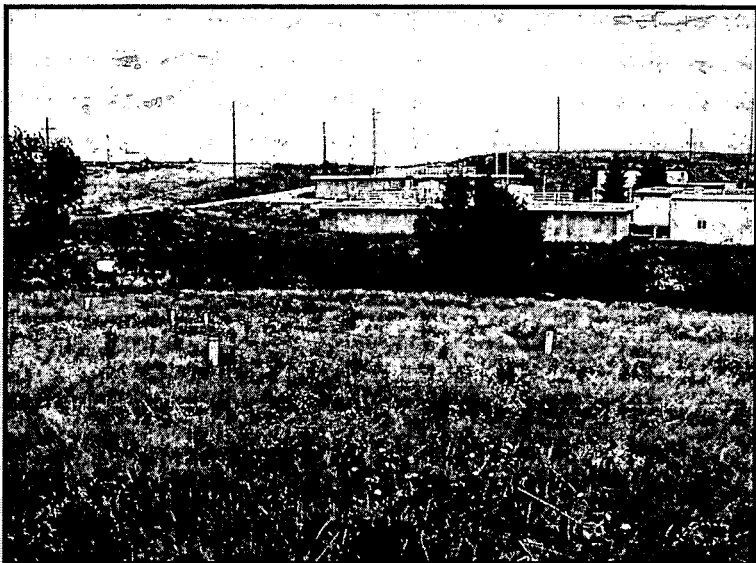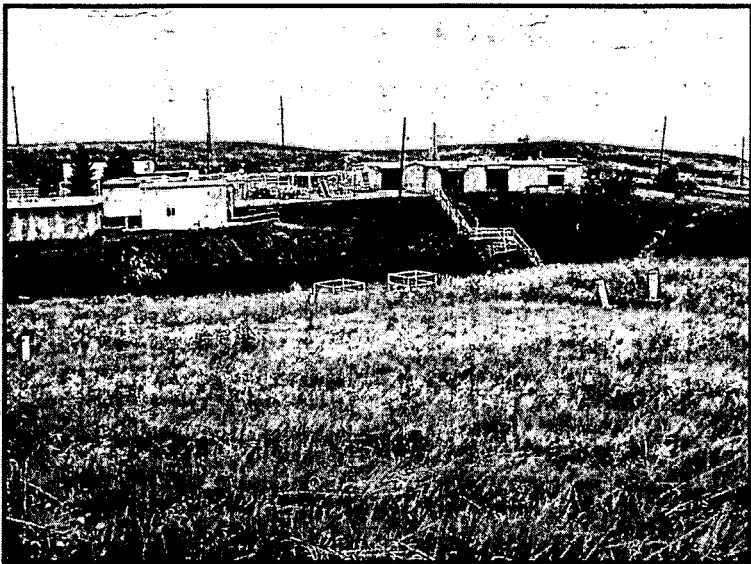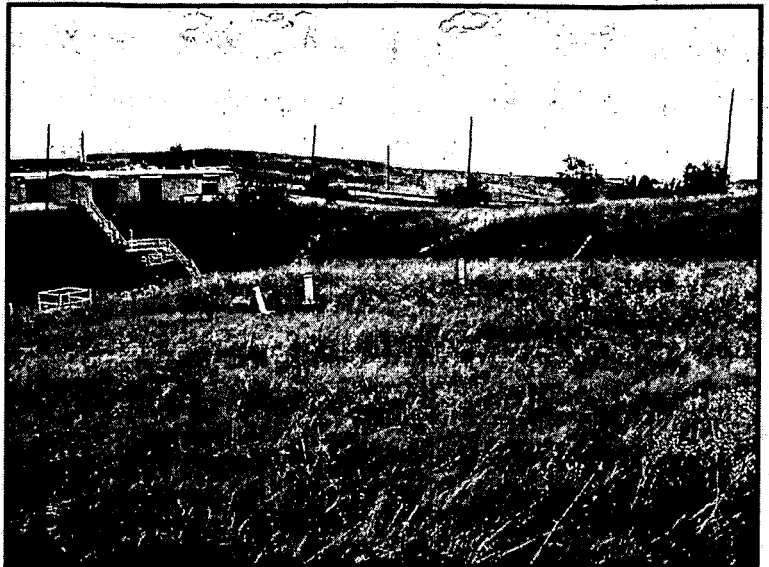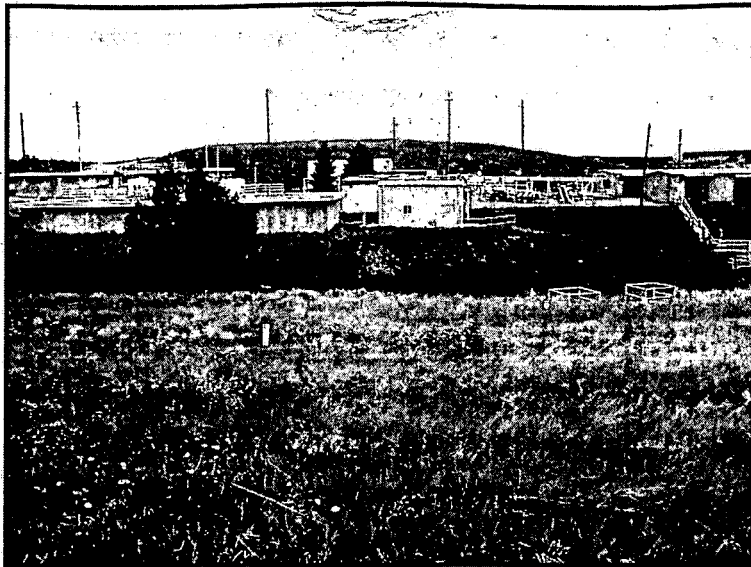
Qualitative Revegetation Evaluation Form

Form #_____

Date_____ 7/1/04

Observer(s)_____ JKN

Location ID_____ Culvert Removal

Photographs taken today?   (Y)   N

Are seeded plant species present?   Y   N   — Unkn

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

Area was just Trampled so pre-existing veg return

Any evidence of nutrient or water deficiencies? If so, describe. _____ none

Are noxious weeds present?   (Y)   N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

EFCI — 1
CEOH — 1   all plant in summer are T —
CAVUL — 1   are when shown one from hill.
VETH — 1

Are other weedy species present?   (Y)   N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

ALMY — 2
LASC I — 1

Total Vegetation Cover (Estimate to nearest percent) _____ 80%

Suggestions for management: _Watch for weeds. Control if needed next yr._

Other comments: _Natives are ___ + ___ - some SAGxI ____
_Str___ SAExI did well with culverts removed_
_Pool created where culverts ___ at_
_Area looks good & will probably be heavily ___ by next yr._

Completed by: _Jack___   _JKW___ Date _9/1/04_
       Print   Sign

Tot Nox Weed Cov = 1

Qualitative Revegetation Evaluation Form   Form #_____

Date_____9/1/04_____
Observer(s)_____-K, KK_____
Location ID_____OLF 76_____

Photographs taken today?   (Y)   N

Are seeded plant species present?   (Y)   N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

_____AGCA/ - 1_____
_____BOGR/ - 1_____
_____AGSM/ - 1_____
_____
_____
_____
_____

Any evidence of nutrient or water deficiencies? If so, describe. ____none____

_____
_____
_____

Are noxious weeds present?   (Y)   N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

_____CIAR/ - 1_____
_____LEOII - 1_____
_____
_____
_____
_____
_____
_____
_____
_____

Are other weedy species present?   (Y)   N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

_____BRIN/ - 1_____
_____MEOF/ - 1_____
_____HEAN/ - 1_____
_____
_____
_____
_____

Total Vegetation Cover (Estimate to nearest percent)_____5 %_____
_____On matted area_____

Suggestions for management: _Resend are the fall - weed cntl_

Other comments: _Hickory com___ grass & weed gr._
Seed has germated - still small plots. Lots of CIAR1 - spying it today.

Completed by: _J KM_   _J KM_   Date _9/1/04_
                Print   Sign

Tot No Weed Cover = 1

Qualitative Revegetation Evaluation Form   Form #_____

Date_____ 9/1/04
Observer(s)_____ JKN KK
Location ID_____ OPWL East

                                                    try 3 pd. cutil note

Photographs taken today?   (Y)   N

Are seeded plant species present?   (Y)   N

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

_____ AGCAI -3 _____
_____ BUDAN - 1 _____
_____ BOGRI - 1 _____
_____ BOCUI - 1 _____
_____ Aim   - 1 _____
_____
_____

Any evidence of nutrient or water deficiencies? If so, describe. _____ none _____

_____
_____

Are noxious weeds present?   (Y)   N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

_____ CEDII - 1 _____
_____ CDARI - 1 _____
_____ CANUI - 1 _____
_____ ROSCI - 1 _____
_____ BRTEI - 1 _____
_____ VETHI - 1 _____
_____
_____
_____

Are other weedy species present?   (Y)   N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

_____ LASEI   - 1 _____
_____ HIFANI - 1 _____
_____ BRINI   - 2 _____
_____ AGCRI   - 2 _____
_____ MEDFI   - _____
_____
_____

Total Vegetation Cover (Estimate to nearest percent) _____ 70%

Suggestions for management: _Weed control. Add more soil this fall._
No other big concern.

Other comments: _Herbaceous community - grass & forb. Range is diverse_
well. Lots in AGCN - one weed weed.
Not bad for 1st year.

Completed by: _JKW_ (Print)   _JKW_ (Sign)   Date _9/11/07_

Cover Nox Weed = 1

Qualitative Revegetation Evaluation Form   Form #_____

Date_____9/1/07_____

Observer(s)_____KW SS_____

Location ID_____OPWC West_____

Photographs taken today?   (Y)   N

Are seeded plant species present?   (Y)   N

between yellow posts look NW
line & t post & this great

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

BOGR — 1
AGCAI — 2
RUDAI — 1
ANGEI — 1
BOCUI — 1

Any evidence of nutrient or water deficiencies? If so, describe. _____none_____

Are noxious weeds present?   (Y)   N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

KOSCI — 2
CEDII — 1
CIARI — 1
COARI — 1
ERCII — 1
VETHI — 1

Are other weedy species present?   (Y)   N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

BRINI — 2
DYPAI — 1
AGINI — 1
LASEI — 1
MEoFI — 1
PACAI — 2
SEVII — 1
HEANI — 1

Total Vegetation Cover (Estimate to nearest percent)_____65%_____

Suggestions for management: _Cont... weed control Add seed to ..._
= fall.

Other comments: _Herbaceous ... -grass + woody ..._
Reveg. is doing good. Lots of BOCU1 & ODH1 in plan...
Some native weed
Not bad for 1st yr.

Completed by: _John KM_   _[signature] KM_   Date _9/1/04_
       Print   Sign

Nox weed cover = 1

Qualitative Revegetation Evaluation Form.

Form #_____

Date_____ _10/13/04_____

Observer(s)_____ JKN   KK_____

Location ID___ Well Installation   C.l pond area____

Photographs taken today?   Y   (N)

Are seeded plant species present?   Y   (N)

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their condition.

_____N·A_____

_____

_____

_____

_____

_____

_____

Any evidence of nutrient or water deficiencies? If so, describe._____N·A_____

_____

_____

Are noxious weeds present?   (Y)   N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

_____CIARI - 2_____

_____CEDIL - 1_____

_____

_____

_____

_____

_____

_____

_____

Are other weedy species present?   (Y)   N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).

_____BRINI - 1_____

_____AGINI - 4_____

_____

_____

_____

_____

_____

Total Vegetation Cover (Estimate to nearest percent)_____95%_____

Suggestions for management: none

Other comments: Area was only Targeted during [illegible] action. Veg is coming back vegetated. Lots of AGWD & BKWL in area & surrounding. Noticeably less seeded because of preexisting veg still present. The weed control done as planned.

Completed by: [illegible] Print [illegible] Sign Date 10/13/09

Qualitative Revegetation Evaluation Form   Form #_____

Date_____10/13/07_____
Observer(s)_____JKN KK_____
Location ID_____Will Intlct= near CLF

Photographs taken today?   (Y)   N

Are seeded plant species present?   Y   (N)

Which seeded species are present? How abundant are the seeded species? Estimate overall cover of each seeded species
using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%). Comments on their
condition.
_____N A_____
_____
_____
_____
_____
_____

Any evidence of nutrient or water deficiencies? If so, describe._____N/A_____
_____
_____
_____

Are noxious weeds present?   (Y)   N

If yes, what species of noxious weeds are present? How abundant are the noxious weed species? Estimate overall cover of
each noxious species using the following cover class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).
_____CANU -2_____
_____CEDU -2_____
_____C-ARI :1_____
_____LIAA, -1_____
_____
_____
_____
_____

Are other weedy species present?   (Y)   N

If so, what species and how abundant are they? Estimate overall cover of each weedy species using the following cover
class system (1 = <5%; 2 = 6-25%; 3 = 26-50%; 4 = 51-75%; 5 = >75%).
_____LASE1 - 2_____
_____
_____
_____
_____
_____

Total Vegetation Cover (Estimate to nearest percent)_____95 %_____

Suggestions for management: _____ none _____

Other comments: _____ (handwritten, illegible) _____

Completed by: _____ (signature, illegible) _____ Date: 10/17/07
Print   Sign